

# Tribes & Climate

## National Tribal GIS Conference (NTGC)

SIPI, Albuquerque, NM

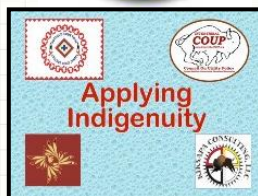
**Margaret Herzog, PE, PMP, [PhD \(link\)](#)**

Bureau of Indian Affairs (BIA)

Tribal Climate Resilience Program (TCRP)

(Sealaska MBS contractor)

**Date:** Thursday, November 17, 2016



## Today! Four Part Round-Table Discussion

- **Climate Science**
  - How do we **really** know that the current **disruptive** rate of climate-change is caused by unprecedented **Anthropogenic** (human) factors?
- **Climate Impacts**
  - Which **parameters** do climate scientists **measure** to determine departures from normal rates of change from the bottom of the ocean to the top of the atmosphere?
- **Building Climate Resilience – BIA Program & Tools**
  - Even if humans could transform to quit **terraforming** towards an **inhospitable planet**, much damage has already been **locked in**, so how do nations, regions, and communities **mitigate** and adapt to reduce risks and impacts now and **into the future**?
- **Role of GIS: Tribal Demos and Federal Data & Mapping**
  - Unlike any other great challenge, our actions are **directly responsible** for the climate crisis, so how can GIS professionals help?



## INTRODUCTIONS *TALKING CIRCLE*

1. Name
2. Tribe, Agency, Company, and / or Group
3. Climate Impacts Observed
4. GIS or other approaches you hope to apply to reduce risks and adapt?

*Please keep your response to between 30-60 seconds*

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**CLIMATE CHANGE?!  
ISN'T THE WEATHER  
ALWAYS CHANGING?**

Image from  
<http://350.org>  
of Global Climate March  
preceding [United Nations](#)  
[Framework Convention on](#)  
[Climate Change COP21](#)  
November 29, 2015



### Climate Literacy Principle – Earth’s Balance

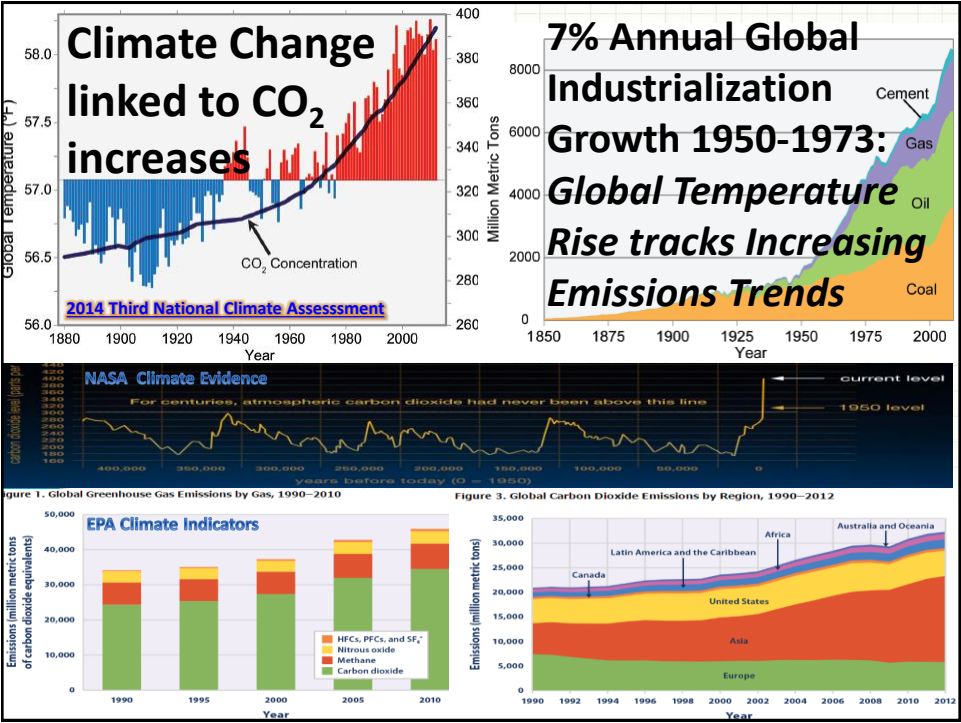
Sunlight that reaches earth heats the land, air, and ocean, but some is reflected back into space. The atmosphere – the thin blanket of high-pressure gases, vapor and particles that fill the sky - reradiates a portion of **escaping surface energy** back as infrared heat: **Back Radiation** reflected back = **Greenhouse Effect** – **global warming**

**VISIBLE LIGHT**      **INFRARED HEAT**

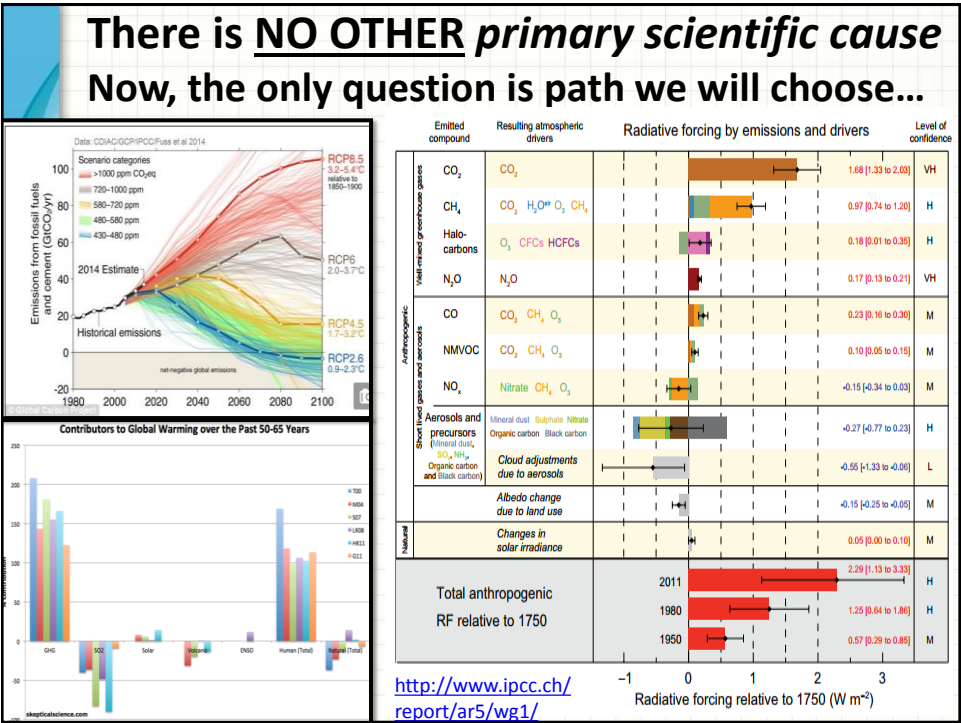
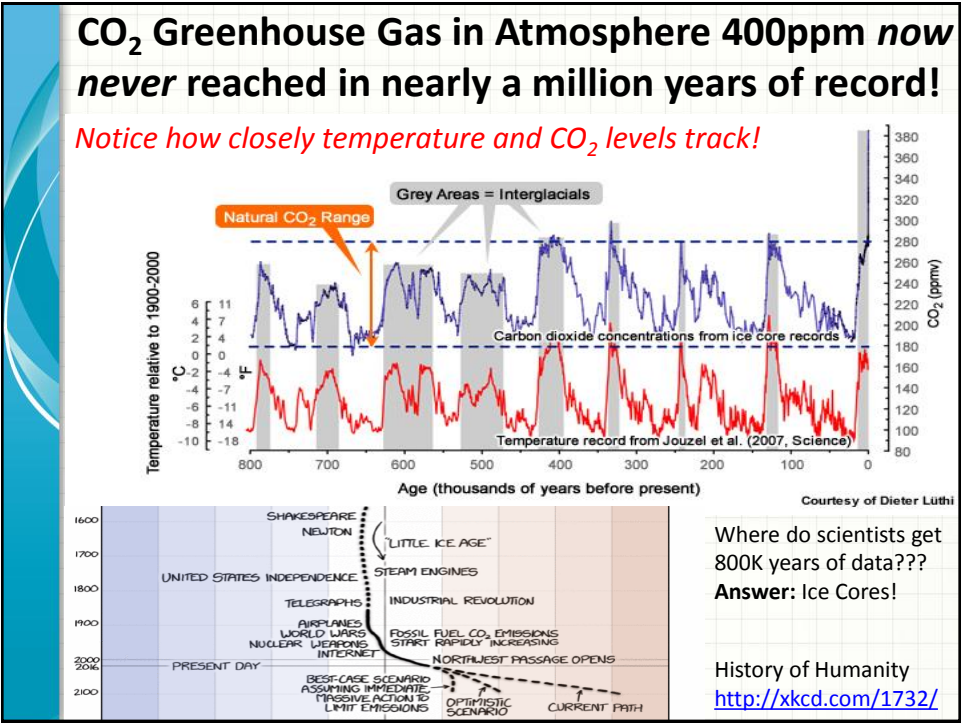
[http://www.esd.noaa.gov/emd/outreach/carbon\\_toolkit/basics.html](http://www.esd.noaa.gov/emd/outreach/carbon_toolkit/basics.html)

[https://en.wikipedia.org/wiki/Greenhouse\\_effect](https://en.wikipedia.org/wiki/Greenhouse_effect)

A car can become deadly hot in just 10 minutes.  
LOOK BEFORE YOU LOCK









## MATTER OF *EVIDENCE* NOT BELIEF!

<http://nca2014.globalchange.gov/>

*Science is irrefutable, evidence like gravity, quickly accelerating*

- **Arctic sea ice** – albedo white to dark, like dust on snow, feedback affect + **sea level rise**, sea ice no longer protects Western Alaska coastal communities by fall, **torn apart in storm surge**
- **Ocean heat content** – top half mile measured, great barrier reef bleached this year, worse hurricanes, surface temperature increase leads to **toxic blooms** and bacteria – **vibrio v.**
- **Temperature** – over land increasing faster, **heat waves** and **droughts**, wildfires, dry soils
- **Ocean acidification** – one-third CO<sub>2</sub> from atmosphere stored in ocean, increase acidity, prevents hard-shelled creatures, krill, clams, etc. from forming, food chain may be decimated
- **Clouds over land increase** – more severe, longer, unexpected, and /or frequent storms
- **Snowmelt** – earlier and less coverage, less water will be available downstream in late season
- **Permafrost melts** – no firm foundation for roads and buildings, releases methane as feedback
- **Health impacts** – higher rates of respiratory illness, vector-borne disease like Zika, accidents

## Temperatures will continue to increase, Precipitation in fewer more intense events

**Temperatures:** Increasing across the US.

Projected Temperature Change

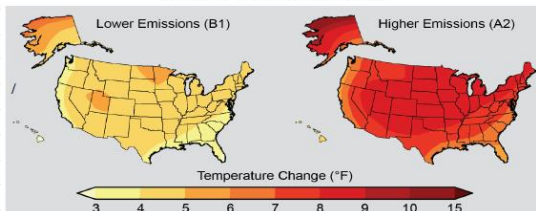


Figure 4: Projected temperature changes. Image from NOAA NCDC / CICS-NC. Extracted from NCA 2014.



Figure 5: Photo of Manager's Dam. (Mike Vail).

### Precipitation:

- Average annual precipitation – small changes
- In many regions, precipitation likely to fall in fewer more intense events.

Figure to the right shows projected changes averaged across many climate projection models.

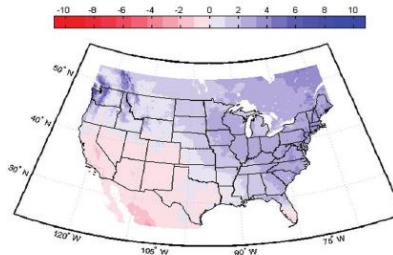


Figure 6: Projected average annual precipitation changes. Image from USGS. Extracted from NCA 2014.

Slide Prepared by Michele Minihi, BIA SOD

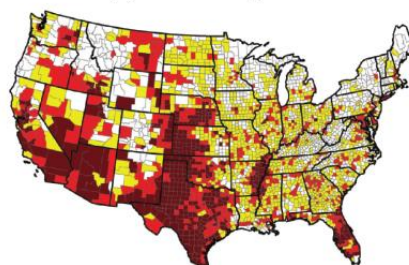
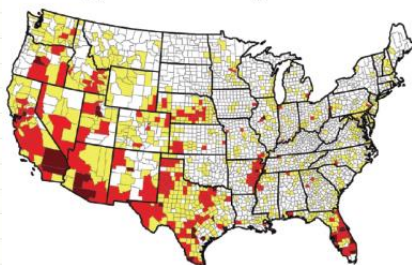
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## Water & Food Scarcity, Disease, Extremes

### Water Shortages: 10% now, 32% 2050, 2100?

(a) No Climate Change Effects

(b) Climate Change Effects



Water Supply Sustainability Risk Index (2050)

Source of all graphics:

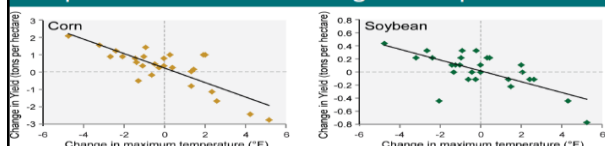
2014 Third

National Climate

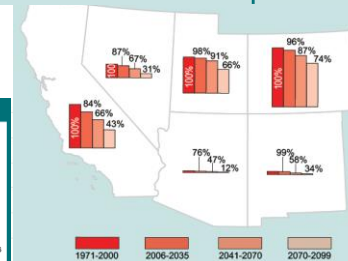
Assessment Overview

Extreme (29)  
 High (271)  
 Moderate (821)  
 Low (2020)

#### Crop Yields Decline under Higher Temperatures



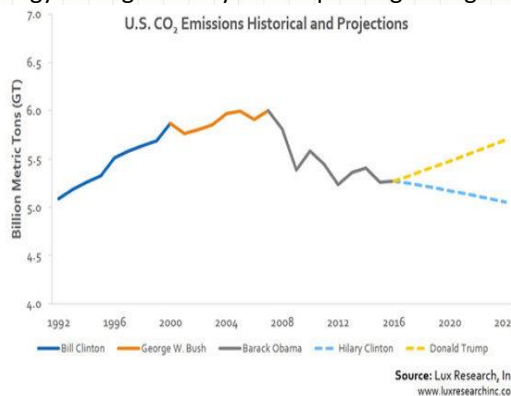
#### Projected Snow Water Equivalent



## Overheated: [How Cooler Heads Can Cool the World](#)

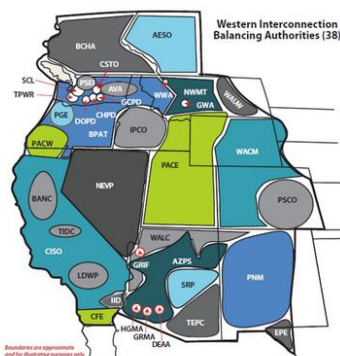
Michael Bloomberg, analyst / NYC with Sierra Club, Carl Pope

- Cities and Tribes & **Breakthrough BIZ** can help win the climate war!
- Already the technology is feasible and accelerating, so subsidies and regulation overhaul may be needed to increase fossil fuel output beyond natural gas as easily accessible oil supplies dwindle + economics favor innovation
- Storage tech and distributed energy management systems options growing
- Oil companies adjust to global markets
- State regulatory bodies control utilities
- Natural gas 117 vs.
  - Coal burning 227
  - Less cost to transport than coal
  - Less cost to produce than coal
  - Will definitely have pipes
    - Negotiate monitoring
    - Negotiate leak detection
- [ORNL](#): CO2 to ethanol catalyst! [DOE 75 ARPA-E](#) storage options: [CAES](#), [Hybri-Sol](#)



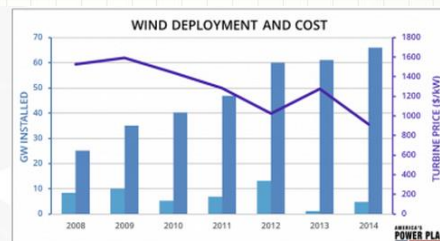
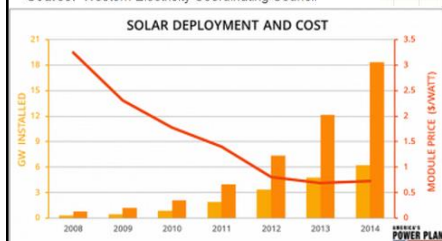
Source: Lux Research, Inc.  
www.luxresearchinc.com

## Renewables, Improving Storage, Smart Grids



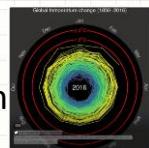
Source: Western Electricity Coordinating Council

- [World Leaders](#)
- [States](#), [Cities](#) & [Tribal Nations](#)
- [Business Leaders](#)
- [Scientists and Researchers](#)
- [You and Me](#) – [our communities](#)
- TOGETHER we can speed the [transformation to net zero!](#)

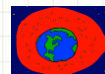


## Communicating Climate for ACTION!

- Psychology of Climate Change Communication  
[http://guide.cred.columbia.edu/pdfs/CREDguide\\_full-res.pdf](http://guide.cred.columbia.edu/pdfs/CREDguide_full-res.pdf)  
Framing Key! Make Message Matter Broadly, Health/Security, Stories
- Connecting on Climate - Emphasize solutions and benefits at home  
<http://www.connectingonclimate.org>, [15 Steps to Effective CC Communication](#)
- How to talk about Global Warming in Plain English  
<https://www.scientificamerican.com/article/how-to-talk-global-warming-in-plain-english/>
- [Climate Action](#) is infectious, [Spread the Disease!](#)
- Lazy Person's Guide to Saving the World  
<http://www.un.org/sustainabledevelopment/takeaction/>
- Baseball, Steroids, and Climate Change  
<https://www2.ucar.edu/atmosnews/attribution/steroids-baseball-climate-change>



THE  
LAZY PERSON'S  
GUIDE TO  
SAVING THE WORLD

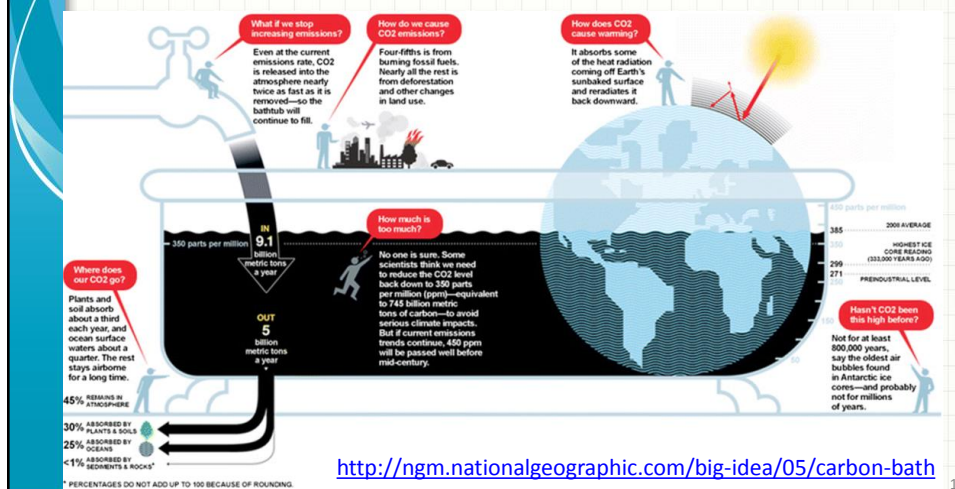




## NatGeo: Bathtub Effect Infographic Best!

- Understanding Accumulation and Growing Impacts

<http://www.sciencedirect.com/science/article/pii/S0749597808000447>



## Indigenous People Face Disproportionate Impacts of the Climate Crisis on Lifeways

Food Like Wild Rice Cannot Grow in Traditional Ranges



Infrastructure Falls Apart and Homes Sink in Alaska



Source of images:  
[2014 Third National Climate Assessment Overview](#)

## Dan Wildcat has issued a **RED ALERT** to all!

- Learn from non-“weeds” who’ve lived in symbiotic relationships with nature from time immemorial
- Deep awareness and communication with all living beings as relatives vs. reductionist science by discipline
- “Learning by doing”- everything is an experiment evolving in concert and pace with ecosystems of place
- Those in constructed reality forget about emergent properties of complex systems; even the smallest neglected interrelationship or feedback may impact
- No dualisms / dichotomies – many paths & ways
- Combat lack of imagination with INDIGENUITY!
- **Tribal GIS Professionals** must play their role!!

Red Alert!: Saving the Planet with Indigenous Knowledge by Professor Wildcat, Haskell Env Prog

## Tribes will not make decisions based solely on Climate & Weather

- Tribes must be able to integrate climate information with their other value drivers
- Information must be relevant to their values & motivations
- They must trust the information source
- Adaptation is easiest understood through a resilience lens and a path walked by others

*Per NOAA David Herring on  
Climate Resilience Toolkit  
WebEx 6/10/15 presentation*



Water Resources



Development Pressure



Energy Costs

## Tribes & Climate

### Strategies and Preferred Methods



<http://risingvoices.ucar.edu>

## Six Tribal Nations Subtopics

### *Strategies for Building Climate Resilience*

<http://toolkit.climate.gov/topics/tribal-nations>

1. [Assessment and Planning](#)
2. [Adaptation](#)
3. [Mitigation](#)
4. [Disaster Risk Reduction](#)
5. [Relocation](#)
6. [Capacity Building](#)
7. [TRIBAL HEALTH](#)

[\(new topic under consideration\)](#)

**Jump from  
[Tribal Fact Sheet](#)  
to Tribal Nations  
by selecting an  
Example or Tool!**

<http://toolkit.climate.gov/tribal/>  
Tribal Climate Resilience  
Resource Guide

Organizes [Tools](#) and [Taking Action Stories of Resilience](#)

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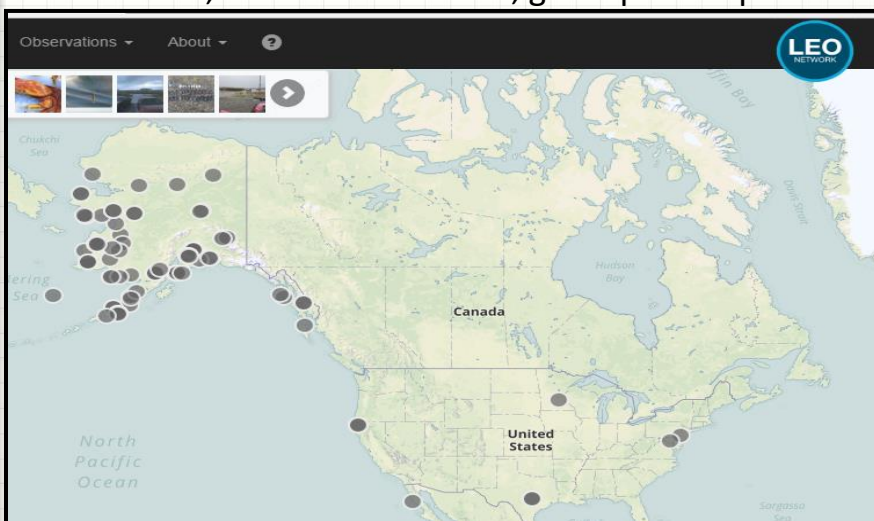
## 1. Climate Adaptation Planning & Assessment

- Best way to maximize ability to mitigate, adapt, and respond to disasters is through integrated planning and iterative assessment activities
- Methods favored
  - Community-based climate education and valuation
  - Elders involved in policy development to incorporate traditional beliefs, value systems, tech, and protect holders
  - Continually improve all aspects of community resilience
  - Incorporate models agreed upon by all, talking circles
  - Focus on community health, medicine wheel concept
  - Take advantage of self-determination and sovereignty to continually improve policies and regulation to maximize benefits
  - Partner with federal, academic, state, local, non-profit and tribal
  - Leverage resources in community and from without systematically

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## Local Environmental Observer's Network

<https://www.leonetwork.org> – Make an unusual observation, share it to network, get expert help



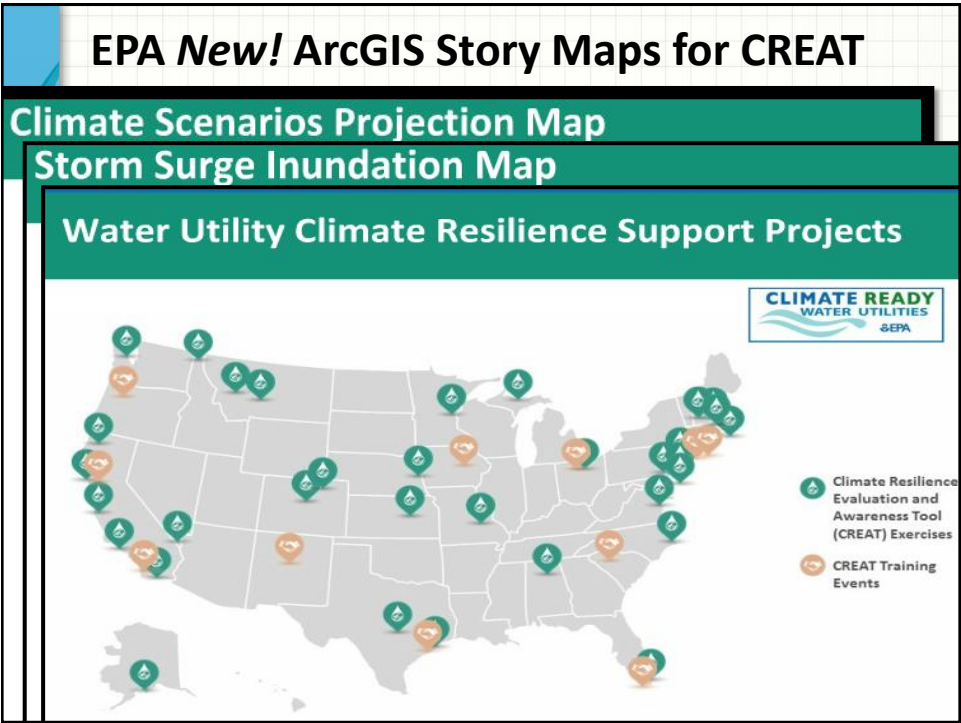
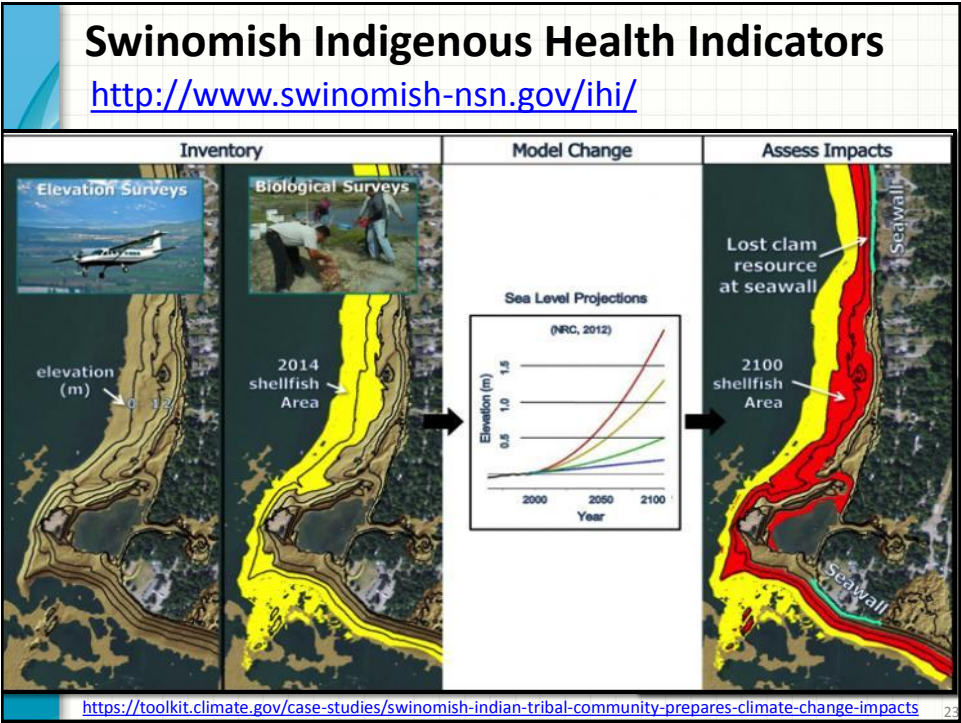
<http://bia.gov/WhoWeAre/BIA/climatechange/Resources/Tribes/IntertribalFactSheet/index.htm?itgrp=anthc>

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Questions? Contact Margaret T. Herzog, PE, PMP, PhD

BIA Climate Program, IT / GIS Systems & Services

Margaret.Herzog@bia.gov, (720) 484-3353





NATIONAL *fish, wildlife & plants*

CLIMATE ADAPTATION STRATEGY

<http://www.wildlifeadaptationstrategy.gov>

- ✓ *Shared Solutions to Protect Shared Values*
- ✓ Seven Strategies to Ensure Resilient Ecosystems
- ✓ Video, Brochure, Full Report, Background Papers
- ✓ Taking Actions (Using the Strategy)
- ✓ Engagement (Getting Involved and Involving Others)
- ✓ Learn More about Impacts & Adaptation
- ✓ Adaptation Leadership Award Honors Innovators
- ✓ Case Studies by Region and Habitat Type
- ✓ Join [Landscape Conservation Cooperatives \(LCCs\)](#)!

Expanded! Tribal Climate Change Resource Guide

<http://tribalclimateguide.uoregon.edu/> or CRT TOOL!

UNIVERSITY OF OREGON

Tribal Climate Change Guide

The Tribal Climate Change Guide is part of the Pacific Northwest Tribal Climate Change Guide, released in November 2015 and is a beta version of our new online guide.

Funding

Adaptation Plans

Climate Programs

Climate Jobs

Events

Funding

The Tribal Climate Change Funding Guide is intended to provide up-to-date information on grants, programs and plans that may assist tribes. If you have questions or updates for this guide, email: [kathy@uoregon.edu](mailto:kathy@uoregon.edu).

Search by Keyword

Geography

- Any -

Apply

Reset

Title	Organization	Grant Deadline	Description
NOAA 2016 Coral Reef Conservation Program International Coral Reef Conservation Cooperative Agreements	NOAA (National Oceanic and Atmospheric Administration)	11/19/2015	The NOAA Coral Reef Conservation Program (CRCP) provides matching grants for international solicitation of proposals that will support the NOAA Coral Reef Conservation Program's International Strategy. The International Strategy focuses on supporting existing regional efforts in four priority regions: reef ecosystems and existing initiatives and partnerships. Two of these four priority regions will be Opportunity, the Wider Caribbean and Micronesia...In FY 2016, the CRCP will accept applications for a two-year project period focused on building international capacity for the effective ecosystem-b...

Access the TCCG from ANY Tribal Fact Sheet Funding or Tool section!

Questions? Contact Margaret T. Herzog, PE, PMP, PhD

BIA Climate Program, IT / GIS Systems & Services

[Margaret.Herzog@bia.gov](mailto:Margaret.Herzog@bia.gov), (720) 484-3353

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## Tribal Nations Tools for Haskell Case

27 **TLC, NEON, Nature's Notebook, and other tools could link!**

## 2. Tribal Adaptation Efforts

<http://toolkit.climate.gov/topics/tribal-nations/adaptation>



- Climate impacts already occurring and projections ascertain much worse is already “locked in”, so tribes are doing their best to adapt despite constraints
- Methods favored
  - Shifting Species – substitution, assisted migration, [seed banks](#)
  - Invasive Species – removal, [management](#), reuse, acceptance
  - Cultural Resources – coastal & stream bank protection, [THPO](#)
  - Cultural Continuity – [STEM students](#) with language & culture
  - Elders and Knowledge Integration – methods to use power of deep observation and understanding of connectivity, nature-based/honoring, ecological / technological progress ([CSKT](#))
  - Networks and Partnerships – [Inter-Tribal](#) policy through consultation, [standing groups](#), and [NCAI](#) / [NARE](#) nationwide

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### Changes in Ocean Chemistry Affects Many Species

Suquamish Case Study – CRT Assessment Subtopic: <http://toolkit.climate.gov/taking-action/suquamish-build-resilience-ocean-acidification-through-education>


NRDC OA in the Pacific NW: <http://www.nrdc.org/oceans/acidification/pacific-northwest.asp>




**Upwelling**  
This phenomenon occurs when natural weather patterns churn up deep, acidic water onto coastlines.


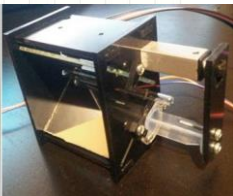



**Oyster Die-Off**  
High mortality and reproductive failures are linked to elevated ocean acidity.



**Algae Blooms**  
Pollution from fertilizers and leaky sewage systems cause algae to bloom. The algae decompose, raising acidity levels.

 **ACIDIFICATION HOTSPOT**



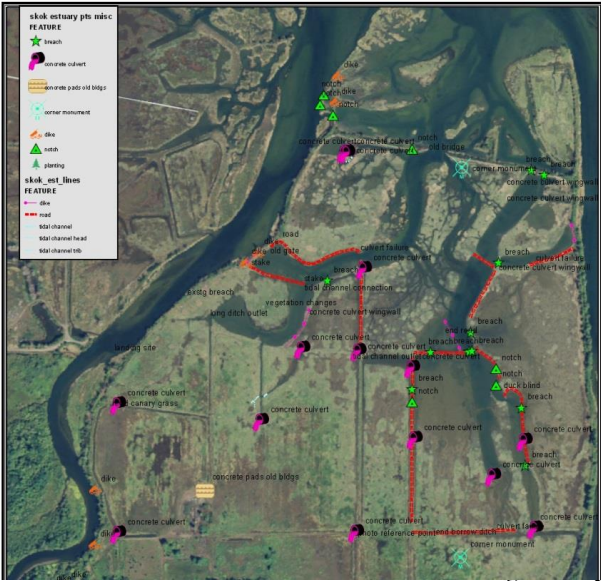
Ocean Acidification Curriculum Collection

WASHINGTON

OREGON


### Skokomish Estuary Restoration Nalley Island Phase II

108 acres of inter-tidal wetlands restored for resilience



**Nalley Island Phase 2 GPS points**

March 2010  
Cartographer: Luke Cheney

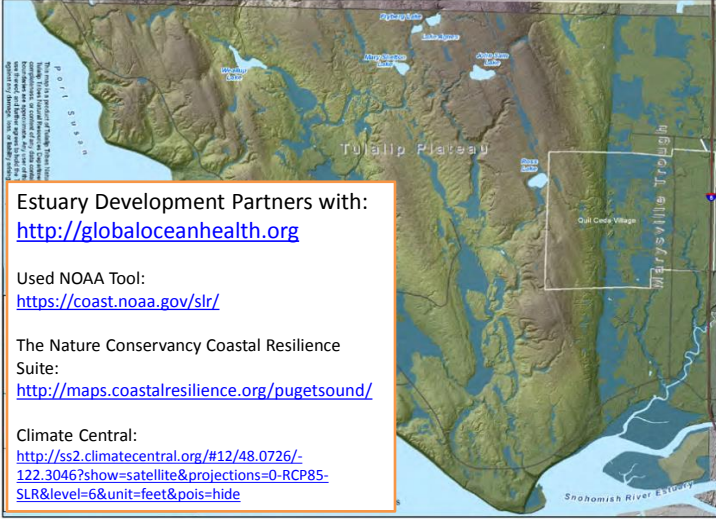


[http://www.psnerp.ekosystem.us/prun.aspx?p=Page\\_e7e0ad79-17d5-489b-9ed8-cb76f1f7c879&m=1&text=skokomish+estuary](http://www.psnerp.ekosystem.us/prun.aspx?p=Page_e7e0ad79-17d5-489b-9ed8-cb76f1f7c879&m=1&text=skokomish+estuary)

## Tulalip / Landowner / Ocean Partnerships

### Lands Swap and Energy from Ranching Waste

- Provide uplands to farmers in exchange for riparian



Tribe converts cattle manure through Waste-to-Energy process to reduce water quality impacts. Ranchers receive the cheaper energy back!

Estuary Development Partners with:  
<http://globaloceanhealth.org>

Used NOAA Tool:  
<https://coast.noaa.gov/slr/>

The Nature Conservancy Coastal Resilience Suite:  
<http://maps.coastalresilience.org/pugetsound/>

Climate Central:  
<http://ss2.climatecentral.org/#12/48.0726/-122.3046?show=satellite&projections=0-RCP85-SLR&level=6&unit=feet&pois=hide>


<https://toolkit.climate.gov/case-studies/tulalip-tribes-saving-their-sacred-salmon>

## CRT Tools for Tribal-focused Climate Study

www.globe.gov


THE GLOBE PROGRAM

A Worldwide Science and Education Program



Dr. Elena Bautista Sparrow  
U.S. Partner Coordinator for India

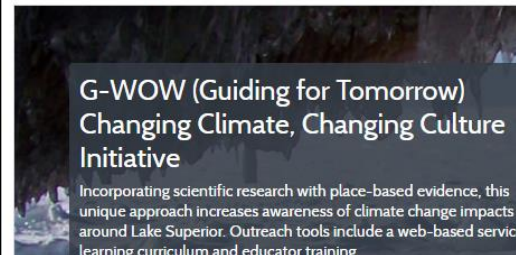
Tools > Ocean Acidification Curriculum Collection >



**Ocean Acidification Curriculum Collection**

Use this database to download free K-12 lesson plans and other educational materials relating to ocean acidification.

Tools > G-WOW (Guiding for Tomorrow) Changing Climate, Changing Culture Initiative >



**G-WOW (Guiding for Tomorrow) Changing Climate, Changing Culture Initiative**

Incorporating scientific research with place-based evidence, this unique approach increases awareness of climate change impacts around Lake Superior. Outreach tools include a web-based service learning curriculum and educator training.

Ocean Acidification Curriculum Collection

Search the Collection | About the Project | About Us | My Materials | Collections with the GLOBE Program

Abstract: Collection of educational materials that include detailed descriptions of the content of materials.

Showing 1 - 10 of 30 results

Search results:

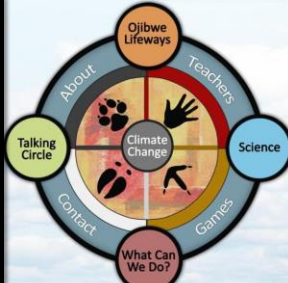
- 1. 0-2
- 2. 3-5
- 3. 6-8
- 4. 9-12

FOR USE BY GRADE RATION:

- 1. K-2
- 2. 3-5
- 3. 6-8
- 4. 9-12

FOR USE BY OTHERS BY ACTIVITY:

- 1. Education Activities
- 2. Games
- 3. Informational Resources
- 4. Lesson Plans



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### 3. Tribal Mitigation Efforts – Best hope!

<http://toolkit.climate.gov/topics/tribal-nations/mitigation>

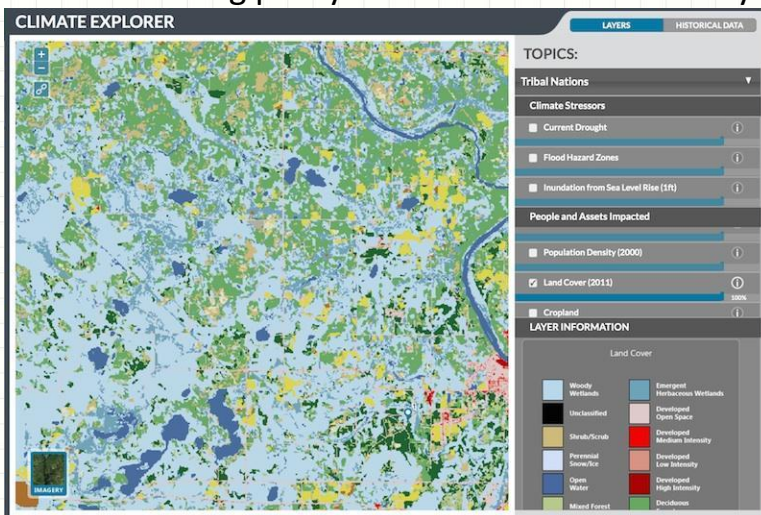
- Reduce causes of future climate change, esp. CO<sub>2</sub>
- Less adaptation needed, if less heating occurs
- Methods favored:
  - Casinos and administrative building – zero net energy ([FDLC](#))
  - Food waste composting from casinos, schools and farms ([Tulalip](#))
  - Energy efficient, zero-net buildings, school greenhouse 2 elders
  - Solar roof-top installations and micro-grid applications ([BLR](#))
  - Tribal governments set their own policies, beat COP21 goals!
  - Electrical vehicle plug-in stations and rebates, mass transit
  - Climate education integrated with native language and ways
  - Partner with government agencies: DOE, HUD, USDA, EPA
  - Save money by paying less in long-term energy costs
  - Not dependent on outside utility or strong partnership with it
  - Less affected by extreme weather and economic downturns

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### FDLC – Carbon Footprint Management

Kyoto Protocol signed 1992, Commercial Solar 2016

Buses – no-idling policy and diesel oxidation catalyst





<https://toolkit.climate.gov/case-studies/fond-du-lac-band-lake-superior-chippewa-combine-mitigation-capacity-building>

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## Blue Lake Rancheria – Slash to Biochar

Process takes woody waste and creates soil enhancer by-product while producing energy – Climate Champ!



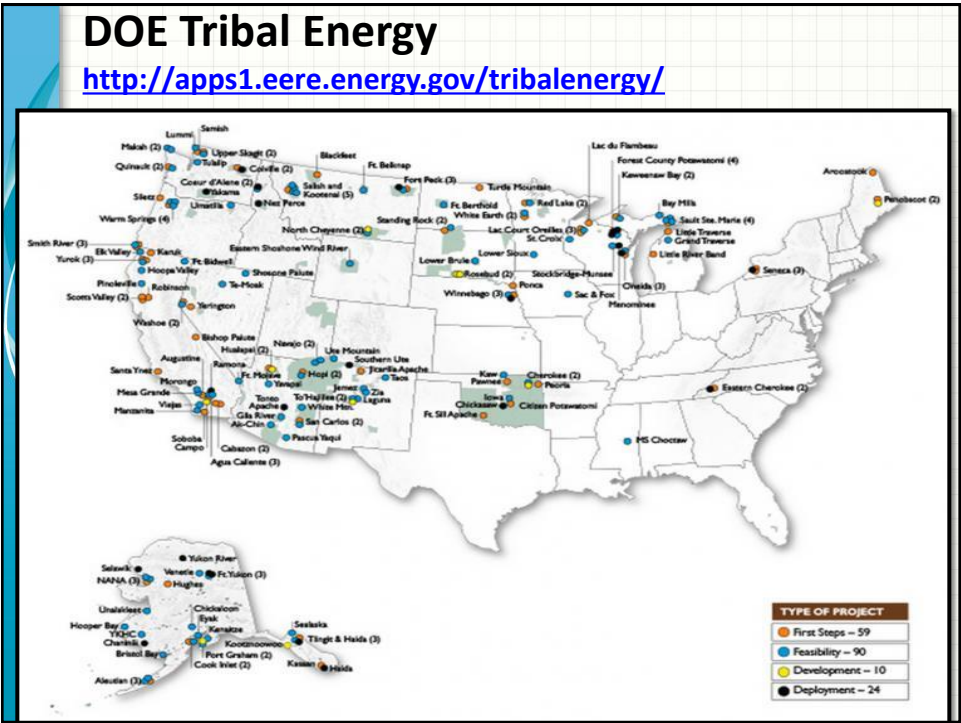
UPS - 2 Liebert (150 kVa and 50 kVa) and 1 MGC (36 kVa) battery banks; 15 minutes of islanded operation (slot machines servers, e lighting)

Sapphire Palace – receives energy from casino service. 800-person capacity; 1 set of restrooms; available shelter-in-place and/or medical facility.

Tribal Office – Separate meter. Kitchen facilities, 1 set of restrooms (septic system)

80kW Generator for Tribal Office; ~24 hours of islanded operation

<https://toolkit.climate.gov/case-studies/blue-lake-rancheria-tribe-undertakes-innovative-action-reduce-causes-climate-change>



## IEED Tribal Toolkit / TEEI Clearinghouse

<http://www.bia.gov/WhoWeAre/AS-IA/IEED/DEMD/TT/index.htm>



## Housing and Urban Development (HUD)

<http://bia.gov/WhoWeAre/BIA/climatechange/Resources/Agencies/AgencyFactSheet/index.htm?ag=hud>

- Healthier Tribal Housing – combining best of old & new  
<http://ehp.niehs.nih.gov/120-a460/> natural, place-based
- Office of Native American Programs (ONAP)  
[http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/public\\_indian\\_housing/ih](http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/ih)
- Resources for Tribal Leaders – build skills & vision  
[http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/public\\_indian\\_housing/ih/codetalk/triballeaders](http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/ih/codetalk/triballeaders)
- Community Relocation Resources (Strategy 3 of 7 covered)  
<http://toolkit.climate.gov/topics/tribal-nations/relocation>
- Newtok Example: Cold Climate Housing Research Center (CCHRC - <http://www.cchrc.org>) collaborations with Alaska Native Health Consortium (ANTHC - <http://anthc.org/what-we-do/community-environment-and-health/center-for-climate-and-health/>)



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## 4. Tribal Disaster Risk Reduction (DRR) Efforts

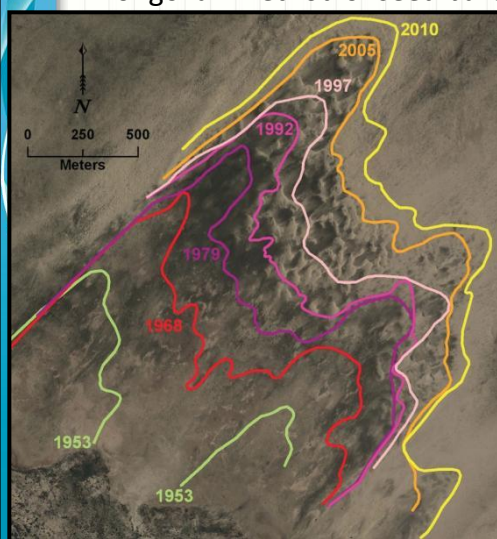
<http://toolkit.climate.gov/topics/tribal-nations/disaster-risk-reduction>

- Extreme weather already disproportionately affects marginalized populations, while climate change will cause more frequent, more devastating impacts
- Methods favored:
  - Discouraging new development or post-disaster redevelopment in vulnerable areas to reduce losses
  - Planning for transportation, including roads and bridges
  - Effective evacuation planning, including the deployment of early warning systems, drought planning triggers
  - Creating multiple evacuation routes and supplies
  - Coordination across jurisdictional boundaries
  - Increasing leadership training and community support
  - Hazard mitigation planning (pre-approved FEMA plan best)

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## Navajo Nation Stabilizes Sand Dunes

<http://www7.nau.edu/itep/main/eeop/> – Students use Mongolian method of seed balls with berms to capture water



<https://toolkit.climate.gov/case-studies/navajo-nation-hotter-drier-climate-puts-sand-dunes-move>

40


## Manage Floods & Droughts as Single Issue

- Too much and too little water on the landscape must be approached as a [single, inter-related, management issue](#)
- More Intense Floods rip up / overflow banks and uproot vegetation
  - leads to sand mobilization and soil / bank erosion, sedimentation
  - water quality degradation, damages WT/WWTF infrastructure
- Methods Favored - Plant TREES! [esp. in urban areas!!](#)
  - [Reconnect](#) fp, wetlands, veg and structures to *capture every drop*
  - Reduce downstream flooding with upstream storage (rights)
  - Store snowmelt that is now or will soon become rain, [control ET](#)
  - Store higher on landscape to trickle down in later dry season
  - Do not drain directly to stream or culvert, plan buffer strips
  - Low-Impact Development (LID) - [UDFCD Volume III manual](#)
  - Implement policies and tech for rain-water harvesting ([Tuscon](#))
  - Examples: [Hopi Raincatchers](#) & [Navajo Sand Dune Restabilization](#)

41

## FEMA and Tribal Nations: A Pocket Guide

<https://www.fema.gov/media-library/assets/documents/99643>


**FEMA**

What are you looking for?

**Plan, Prepare & Mitigate**  
 Before, During & After a Disaster

**Disaster Survivor Assistance**  
 Apply for Assistance, Disaster Declarations






**Response & Recovery**  
 Tools, Teams, Individual & Public Assistance

**Topics & Audiences**  
 Grants, How to Help, Private Sector, Tribal

**Blog, Newsroom, Videos & Photos**  
 News Releases, Social Media, FEMA App

**About FEMA**  
 Offices, Careers, Employee Info, Policies, FAQs

[Home](#) > [Resource & Document Library](#) > [Browse](#) > [FEMA and Tribal Nations: A Pocket Guide.pdf](#)

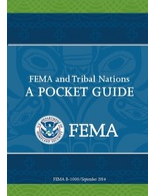
Follow FEMA:     

Share/Email This Page

FEMA and Tribal Nations: A Pocket Guide.pdf

Developed by FEMA's Office of External Affairs, this guides provides information and resources that may be helpful to Tribal partners. The guide explains the Agency's policies related to tribal engagement, outlines key FEMA programs and how they specifically relate to federally-recognized tribes, and provides contact information for the Agency's tribal liaisons.

See [Disaster Risk Reduction subtopic](#) in the Tribal Nations Topic in the U.S. Climate Resilience Toolkit



## 5. Tribal Relocation Efforts

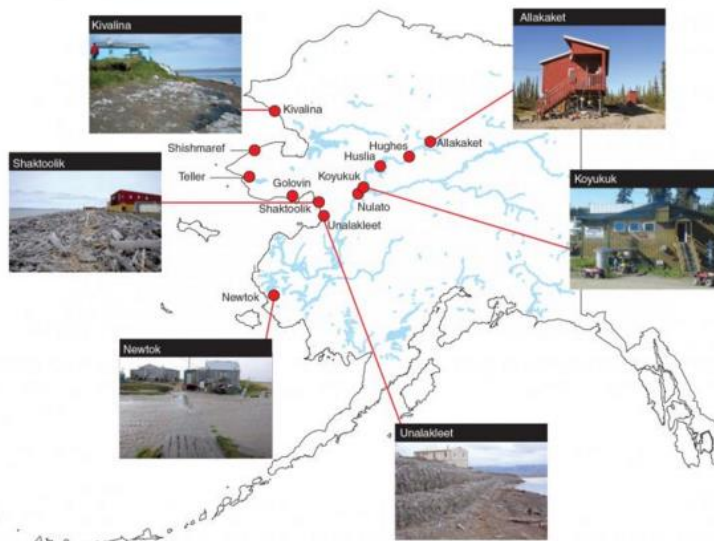
<https://toolkit.climate.gov/topics/tribal-nations/relocation>

- Sea Level will rise due to thermal expansion and melting ice sheets, sea ice, and glaciers
- Storm surge and higher tides – sunny day flooding, salt water intrusion, lake push-up flooding, salt topping
- Methods favored:
  - Discouraging new development or post-disaster redevelopment in coastal areas
  - Beach nourishment – cost increasing and sand becoming scarce
  - Seawalls, pumps, dikes, berms, breakwaters – sand collects
  - Raise buildings or move them back
  - Restore natural estuaries, coves, mangroves, sea grass

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## Alaska Natives in both Arctic & Tribal

Alaska Native Villages Exploring Relocation



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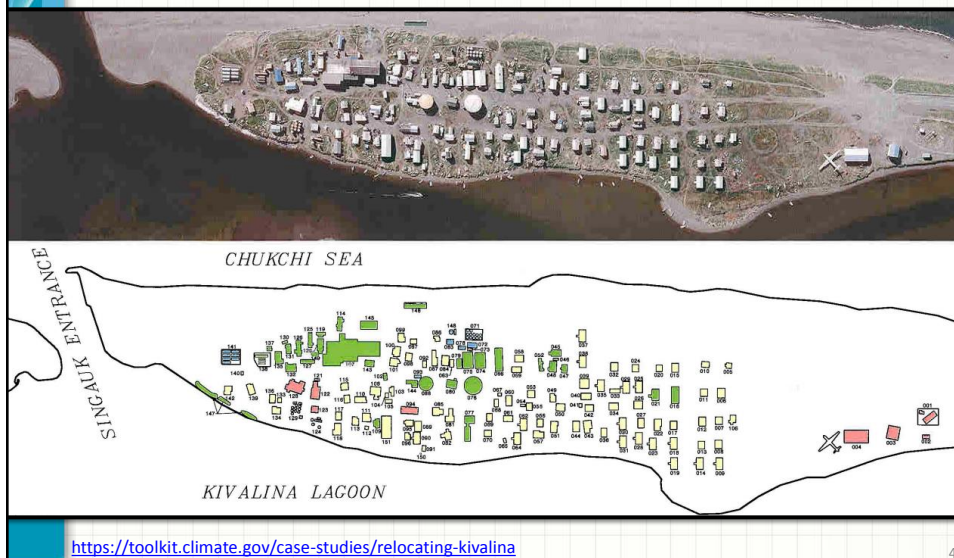
Example from [Relocation Subtopic in Tribal Nations Topic](#), not Arctic



## Relocating Kivalina

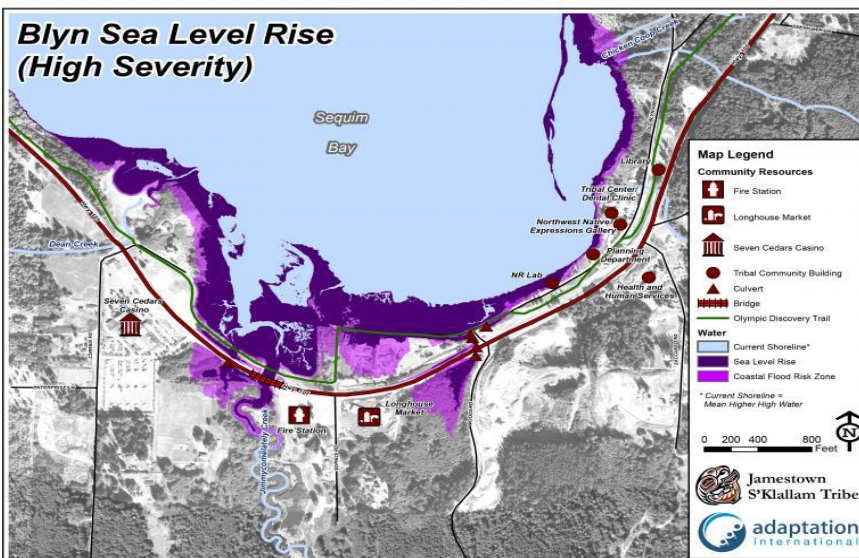
Costs up to \$1M / person to try to move these small villages

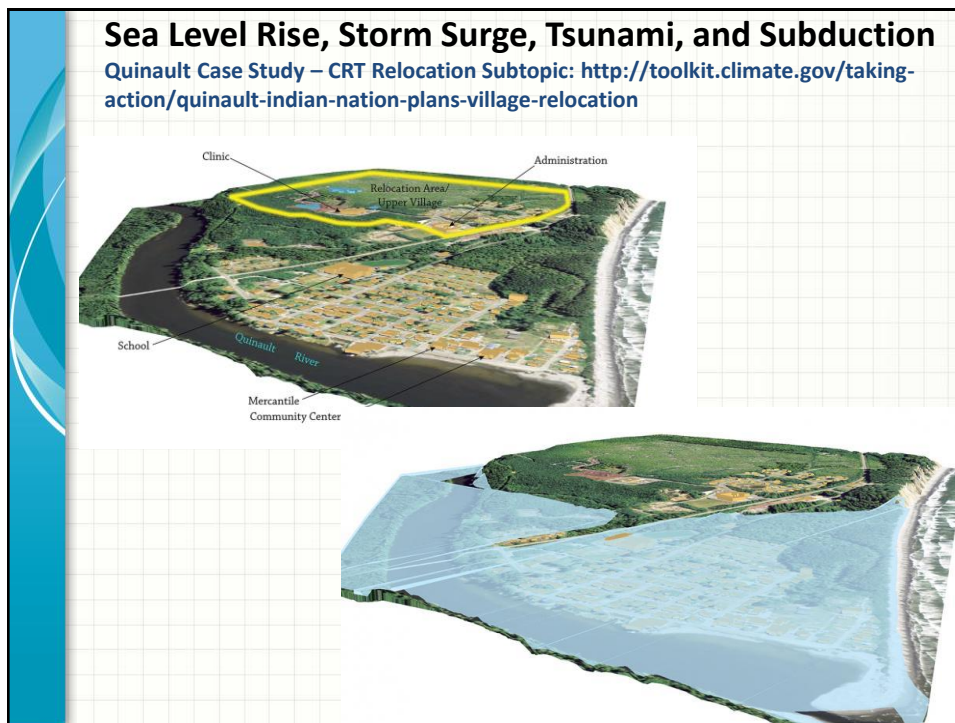
<http://www.poa.usace.army.mil/Portals/34/docs/civilworks/reports/KivalinaMasterPlanMainReportJune2006.pdf>



## Jamestown Climate Adaptation Plan Maps

[http://www.jamestowntribe.org/programs/nrs/nrs\\_climchg.htm](http://www.jamestowntribe.org/programs/nrs/nrs_climchg.htm)





## 6. Tribal Capacity Building Strategy

<http://toolkit.climate.gov/topics/tribal-nations/capacity-building>

- Economically, Historically, Physically and Circumstantially Tribes are disproportionately vulnerable to climate shocks and surprises
- Methods favored
  - Use all federal, state and local government programs at the Tribes disposal ([Mescalero example](#), [CMN SDI example](#))
  - Casino tribes typically have more resources and networks
  - Provide culturally-appropriate opportunities for outsiders
  - Build coalitions among environmentalists and/or landowners that share common interests ([Rooted in the Mountains](#), [Tulalip](#))
  - Elders must be continually involved in expanded youth action
  - Youth must serve the elderly with school produce and meals
  - Systematically learn and apply the principles of Network Weaving: <http://www.orgnet.com/BuildingNetworks.pdf>

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## Tribal Nations Case Example – CMN SDI

### College of Menominee Nation's Sustainable Development Institute Builds Capacity for Tribal Climate Change Adaptation

The Institute—a regional service provider for many Tribal Nations—has developed a unique sustainable development model that incorporates traditional knowledges.



#### Climate change—a threat and an opportunity

Climate change poses a threat to the traditional livelihoods and the sustainably managed forestlands of the Menominee Nation. However, climate change also presents an opportunity—a chance to apply indigenous knowledge to adapt and sustain native communities, and for the Menominee Nation to share its understandings with others seeking to address this global issue.

Related Video: "Through Tribal Eyes: Change on the Menominee Nation" from the College of Menominee Nation's Sustainable Development Institute (15:02)



The Sustainable Development Institute (SDI) at the College of Menominee Nation works with both tribes and non-tribal communities on issues related to sustainability. The Institute combines Western-style research methods with indigenous knowledge to develop a variety of research projects and outreach initiatives, with a focus on the inclusion and development of students—both from indigenous and other communities—to prepare the next generation of scientists and practitioners to become responsible community members.

#### Steps to Resilience:

Step 1: Identify the Problem

Step 2: Determine Vulnerabilities

Step 3: Investigate Options

Step 4: Evaluate Risks & Costs

Step 5: Take Action

#### Tools:

[Adaptation Workbook for Natural Resources](#) >  
[Guidelines for Considering Traditional Knowledges in Climate Change Initiatives](#) >

#### Topic:

[Tribal Nations > Assessment and Planning](#) >  
[Tribal Nations > Capacity Building](#) >

#### Additional Resources:

[The SDI Theoretical Model of Sustainability](#) >  
[Center for First Americans Forestlands](#) >

#### An indigenous-based theoretical model of sustainability

## Haskell HERS Case?

Could showcase NPN Nature's Notebook, Tribal Lands Collaboratory (TLC), Wakarusa Wetlands, and IPCCWG


## Cultural Continuity through Mapping

James Rattling Leaf - Great Plains Tribal Water Alliance Inc. (GPTWA):  
<http://denverro.maps.arcgis.com/apps/MapTour/index.html?appid=60ac74d36ae34ce181e88fb6eeb56831>

### Climate Training/Adaptation Maps, too








#### Lakota Language: Lakota Wicowoyake Canku owapi

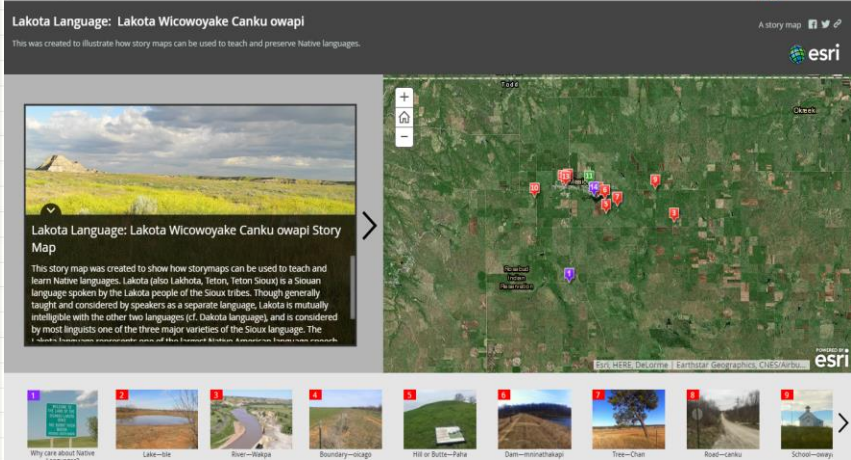
This was created to illustrate how story maps can be used to teach and preserve Native languages.



##### Lakota Language: Lakota Wicowoyake Canku owapi Story Map

This story map was created to show how storymaps can be used to teach and learn native languages. Lakota (also Lakshota, Teton, Teton Sioux) is a Siouxan language spoken by the Lakota people of the Sioux tribes. Though generally taught and considered by speakers as a separate language, Lakota is mutually intelligible with the other two languages (cf. Dakota language), and is considered by most linguists one of the three major varieties of the Sioux language. The Lakota language is the most widely spoken of the three major varieties of the Sioux language.





Questions? Contact Margaret T. Herzog, PE, PMP, PhD

BIA Climate Program, IT / GIS Systems & Services

Margaret.Herzog@bia.gov, (720) 484-3353

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## Cultural Continuity through Mapping

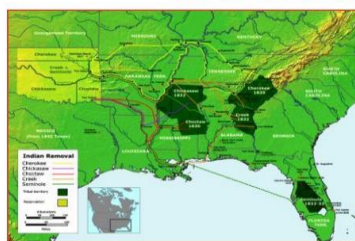
Trail of Tears Story Map – Choctaw GIS, in progress...



Trail of Tears Map

The Trail of Tears was the name used to describe the 1000 mile route that the Five Civilized Tribes were forced to travel, from their homelands in the Southeastern United States to reservations in Oklahoma. The term 'Trail of Tears' was first used by the Choctaw tribe in 1832. The Trail of Tears Map provides a bird's eye view of the location of the lands covered on their perilous journey.

### Where is the Trail of Tears?



Trail of Tears Map

### Indian Removal

Cherokee  
Chickasaw  
Choctaw  
Creek  
Seminole  
Tribal territory  
Reservation

Kilometers  
0 50 100 150  
Miles  
0 50 100

Trail of Tears Map Key

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## DOI Climate Science Centers Support Tribes

- ✓ BIA Tribal Climate Liaisons being placed in each CSC
- ✓ Tribal reps help guide [Advisory Committee on Climate Change and Natural Resource Science](#)
- ✓ Climate Research Projects and Training for Tribes
- ✓ Download climate data and research reports
- ✓ [Guidebook for Traditional Knowledges, and a Primer for Climate Change and Indigenous Peoples](#)
- ✓ Some TCUs and tribes serve in CSC consortiums
- ✓ [Work with your CSC](#) to ensure in 5-year reauthorization TCU, tribes or intertribal groups become consortium members

NW CSC Story Map

<https://www.nwclimatescience.org/story-map>

Northwest Climate Science Center Projects and Data Storefront

NW CSC

Sea-level Rise

Snowpack

Indigenous Knowledge

Cheatgrass


Vulnerability

Identifying, Managing, and Applying Traditional Indigenous Knowledge to Address Climate Change

The Schitsu'umsh people (Coeur d'Alene Tribe of Idaho) have an intimate kinship-based relationship with their landscape. With support from the NW CSC and [USGS National Climate Change and Wildlife Science Center](#), Rodney Frey (University of Idaho) and his colleagues identified the indigenous knowledge and practices of the Schitsu'umsh people that underlie their interactions with the historically dynamic environment of the Palouse. a

Sqigwts\_85Sec

from Brian Cleveley



01:25

HD vimeo

SE CSC Tribal Story Maps

<http://ncsu.maps.arcgis.com/apps/MapSeries/index.html?appid=228ddcf058bf456593ca1494135259a8>

Federally Recognized Tribes in the Southeastern United States

Introduction

This web application provides information related to the federally recognized tribes in the Southeastern United States. Users may pan and zoom each map to view other areas, or zoom in more closely to a particular area. Click on a tab below to automatically be taken to that tribal area. Clicking on the magnifying glass will allow you to enter a specific address and zoom to that area.

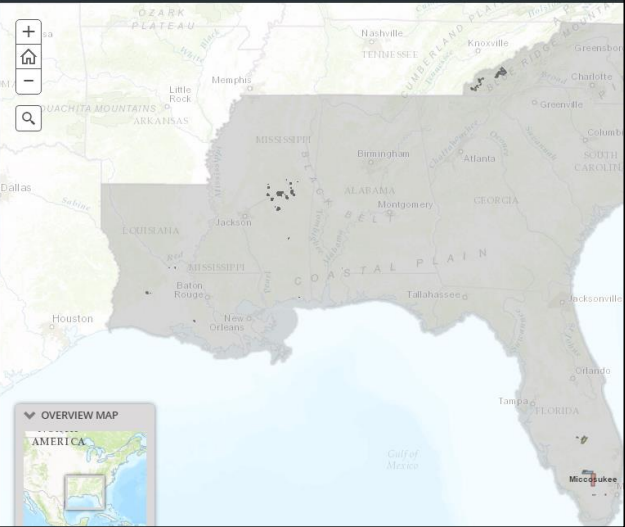
Data was obtained from the Bureau of Indian Affairs- Eastern Region and the latest Census delineations of tribal lands (<http://www.census.gov/aiand/>).

Maps were created by the Center for Geospatial Analytics

Alabama: Poarch Band of Creek Indians

Florida: Miccosukee Tribe of Indians of Florida

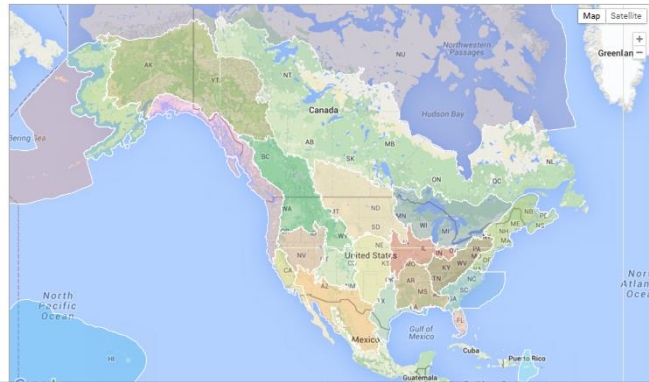
Florida: Seminole Tribe of Florida



## DOI Landscape Conservation Cooperatives (LCCs)

**Find an LCC:** <http://lccnetwork.org/map>, [LCC Fact Sheet](#)

Landscape Conservation Cooperative Network



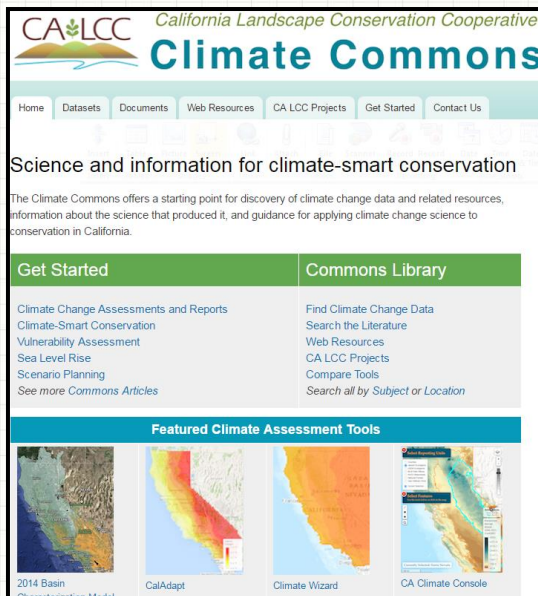
- LCCs may collect and analyze phenology data – how ecology is changing, bud bursts, shifting species
- LCCs may have one or more tribes on their steering committee or subcommittees to help prioritize projects
- LCCs assist tribes to coordinate efforts across larger areas, longer-term with more diverse stakeholders

- Aleutian and Bering Sea Islands
- Appalachian
- Arctic
- California
- Caribbean
- Desert
- Eastern Tallgrass Prairie and Big Rivers
- Great Basin
- Great Northern
- Great Plains
- Gulf Coast Prairie
- Gulf Coastal Plains and Ozarks
- North Atlantic
- North Pacific
- Northwest Boreal
- Pacific Islands
- Peninsular Florida
- Plains and Prairie Potholes
- South Atlantic
- Southern Rockies
- Upper Midwest and Great Lakes
- Western Alaska

## CA LCC California Climate Commons

<http://climate.calcommons.org/>

- Climate change science
- Climate vulnerability assessments
- Climate adaptation planning
- Climate change tools
- Climate change projects
- Climate Datasets and documents



**CA LCC** California Landscape Conservation Cooperative

**Climate Commons**

Home | Datasets | Documents | Web Resources | CA LCC Projects | Get Started | Contact Us

Science and information for climate-smart conservation

The Climate Commons offers a starting point for discovery of climate change data and related resources, information about the science that produced it, and guidance for applying climate change science to conservation in California.

Get Started	Commons Library
Climate Change Assessments and Reports	Find Climate Change Data
Climate-Smart Conservation	Search the Literature
Vulnerability Assessment	Web Resources
Sea Level Rise	CA LCC Projects
Scenario Planning	Compare Tools
<a href="#">See more Commons Articles</a>	<a href="#">Search all by Subject or Location</a>

**Featured Climate Assessment Tools**

- 2014 Basin Characterization Model
- CalAdapt
- Climate Wizard
- CA Climate Console



## CA LCC Tribal Team

<http://californialcc.org/tribal-team>

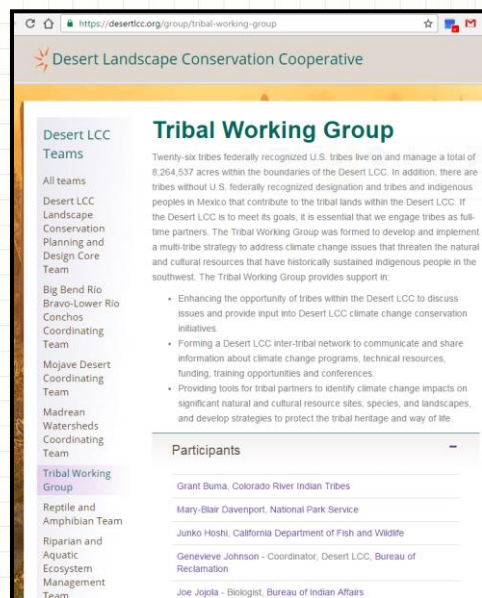
- Chris Bujalski, BIA current team lead
- Dore Beitz, Mewuk incoming lead
- Participate on project proposals
- Guide Ecoregion Adaptation Plans
- TEK Resources
- 2017 adaptation training and webinar series



## Desert LCC Tribal Working Group

<https://desertlcc.org/group/tribal-working-group>

- Seeking new Tribal Liaison for expanded Tribal Outreach
- BIA SW and Navajo Regions participate
- 26 Tribes live in Desert LCC area
- Focus Climate Change Conservation Initiatives
- Inter-tribal network



## Great Basin LCC S-TEK Working Group

<http://greatbasinlcc.org/tribal-resources>

- Sagebrush Grasslands focus
- BIA Western Region participates
- Climate Projects
- Climate Trainings
- Climate Resources

### Tribal Representatives

Ed Naranjo	Confederated Tribes of the Goshute Reservation
Kim Townsend	<a href="#">Duckwater Shoshone Tribe</a>
Gaylord Robb	<a href="#">Paiute Indian Tribe of Utah</a>
Scott Hauser	<a href="#">Upper Snake River Tribes Foundation</a>
William Campbell	<a href="#">Inter-Tribal Council of Nevada</a>

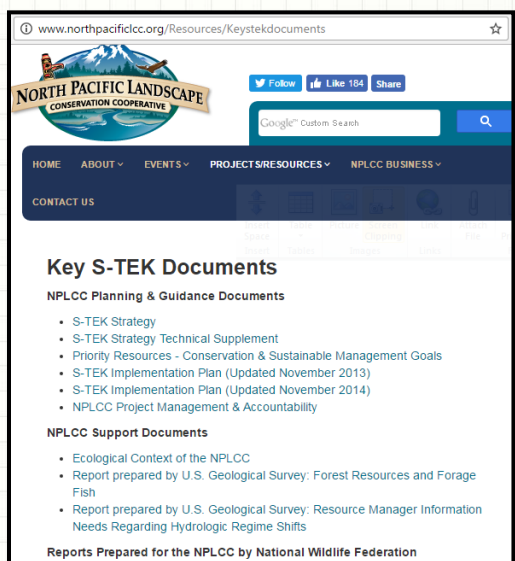


## North Pacific LCC Tribe & First Nations

<http://www.northpacificlcc.org/NPLCCBusiness/tribes-first-nations-committee>

<http://www.northpacificlcc.org/Resources/Keystekdocuments>

- Annual NW Climate Magazine just released
- Newsletter
- PNW Tribal CC Network collaboration
- Climate Projects
- Climate Training
- Funding Opportunities
- Internships



## UofAz NNCAP and SW Tribal CC Network

<http://www.nncap.arizona.edu> (new! website update)



In addition to monthly network calls, contact the program for *specific support* by request!

Example: Tribal Profiles to support proposal development

Co-located with incoming SW BIA Tribal Climate Liaison!

## ITEP Adaptation Training, Tools, Resources

<http://www7.nau.edu/itep/main/ClimateChange>




### Indigenous People’s Climate Change Working Group (IPCCWG)

- Dan Wildcat and Bull Bennett started the group
- Meet in the Spring and Fall
- Working Groups meet throughout the year more
- NASA ELO summer intern program prepares college students for climate careers (<http://kiksapa.com>)

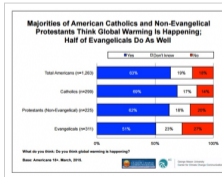


[https://www.facebook.com/pages/Indigenous-Peoples-Climate-Change-Working-Group/205930409437836?hc\\_location=timeline](https://www.facebook.com/pages/Indigenous-Peoples-Climate-Change-Working-Group/205930409437836?hc_location=timeline)

### Early Career Climate Forum



- Derived by students from DOI Climate Center Internship Climate Bootcamps
- Any student interested in Climate can join!





Group	Think Global Warming is Happening	Don't Know	Don't Think Global Warming is Happening
Catholics (not 2010)	75%	15%	10%
Catholics (2010)	75%	15%	10%
Non-Evangelical Protestants	75%	15%	10%
Evangelicals	50%	25%	25%

#### Pope Francis and Re-Framing the Discussion on Climate Change

JUL 20, 2015 • ZACHARY SCHUSTER

The biggest climate change news of 2015 has come from a rather unlikely source: The Vatican of Rome. On June 18<sup>th</sup>, 2015, Pope Francis released his first encyclical, or papal letter, entitled "... more

Find us on  


#### Tweets


ECCForum @ECCForum 20h

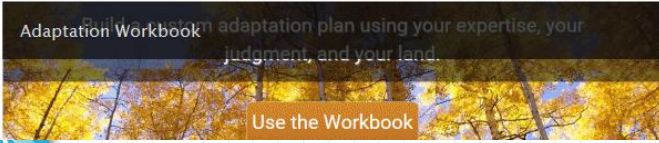
IBM and NREL are developing free and better solar and wind forecasts for the continental US. [mashable.com/2015/07/21/wea...pic.twitter.com/P072sUKXof](http://mashable.com/2015/07/21/wea...pic.twitter.com/P072sUKXof)


<https://www.eccforum.org/>


## Adapting Climate Tools and Curriculum for Tribes



<http://www.cakex.org>


<http://scied.ucar.edu>






<https://www.climate-eval.org>


<http://ankn.uaf.edu>

<http://www.usaid.gov/climate/>

Home About Us Blogs News & Events Studies 2014

Framework for Monitoring and Evaluation  
By: Harris E. Sanahuja  
Study on Framework for Monitoring and Evaluation

Welcome to Alaska Native Knowledge Network

Curriculum Resources

## Citizen Science and Community Monitoring Programs


<http://citsci.org>



188 projects	399,695 measurements	1,221 members	27,986 locations	759 protocols
--------------	----------------------	---------------	------------------	---------------


<http://citizenscienceassociation.org/>

Start a Project >

Benefits Featured Project New Observations

Grants.gov > SEARCH BOX > Tribal Student

includes a variety of opportunities students could assist with



HELP | MANAGE SUBSCRIPTIONS | REGISTER | LOGIN

SEARCH: Grant Opportunities ▾  GO

Search on Tribe, Student, etc. for grants.gov student, tribal, and institutional opportunities students might help support

GRANTS.GOV > Search Grants

SEARCH GRANTS

BASIC SEARCH CRITERIA:

Keyword(s):

Opportunity Number:

CFDA:

SEARCH

OPPORTUNITY STATUS:

☒ Forecasted (17)

☒ Posted (305)

☐ Closed (848)

☐ Archived (14,053)

FUNDING INSTRUMENT TYPE:

☒ All Funding Instruments

☐ Cooperative Agreement (131)

☐ Grant (225)

☐ Other (14)

☐ Procurement Contract (12)

SORT BY: Relevance (Descending) ▾ Update Sort


DATE RANGE: All Available ▾ Update Date Range

1 - 25 OF 322 MATCHING RESULTS:

Previous 1 2 3 4 5 6 ... 13 Next

Opportunity Number	Opportunity Title	Agency	Opportunity Status	Posted Date	Close Date
16-531	Tribal Colleges and Universities Program	NSF	Posted	01/13/2016	
NNH16ZHA0099N-ESTEEM-TCU	EDNS 2016: Appendix E Earth System, Technology, and Energy Education for MURSP (ESTEEM) (Minority University Research and Education Project) for Tribal Colleges and Universities (TCU) NASA ESTEEM - TCU	NASA	Posted	10/06/2016	01/10/2017
NEAAC-ACBURGR-16-013	Student Leaders Program	DOS-NEA-AC	Posted	10/26/2016	12/09/2016
15-599	Innovative Technology Experiences for Students and Teachers	NSF	Posted	08/06/2015	08/09/2017
PAR-16-113	Maximizing Access to Research Careers Undergraduate - Student Training in Academic Research (MARC U-STAR) (T34)	HHS-NIH11	Posted	02/24/2016	05/25/2018
12-551	International Research Experiences for Students	NSF	Posted	04/09/2012	08/15/2017

Help your Tribe, TCU, or Academic Institution and yourself find grants!



DOI / BIA & FEDERAL

GOVERNMENT SEEK TO FULFILL

TRUST RESPONSIBILITY TO TRIBES

AND ALASKA NATIVES BY

PROVIDING SUPPORT

FOR *TRIBAL CLIMATE RESILIENCE*

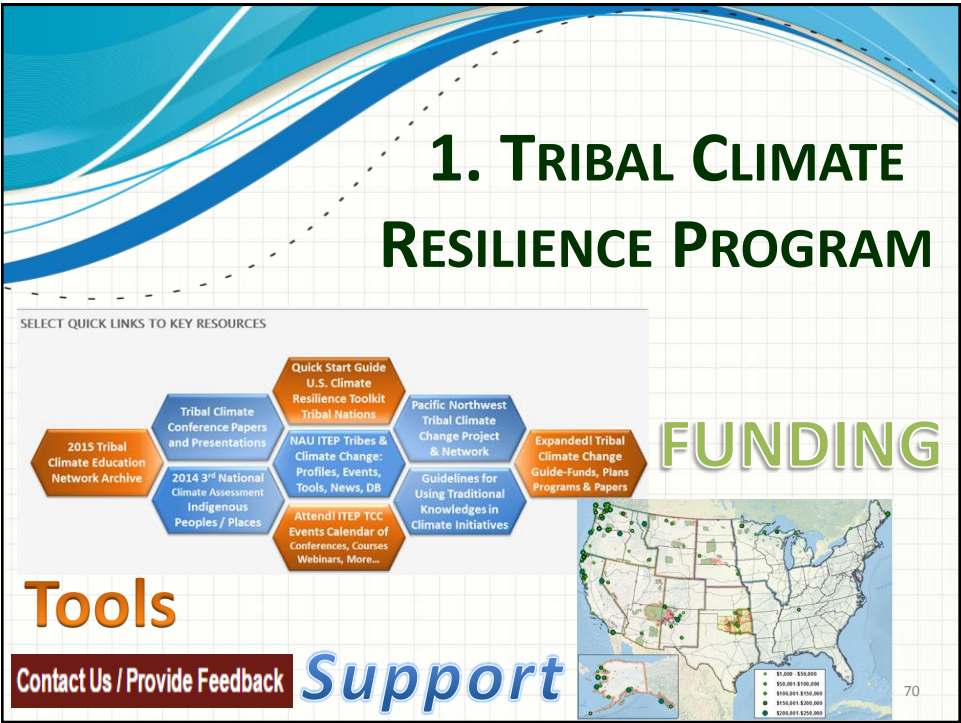
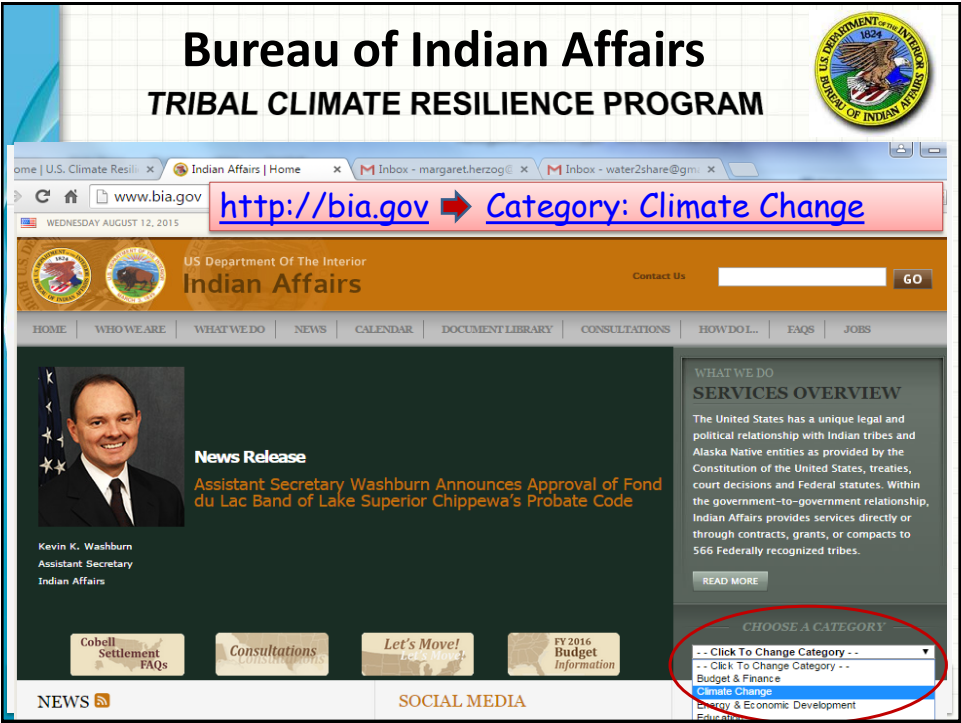
Questions? Contact Margaret T. Herzog, PE, PMP, PhD

BIA Climate Program, IT / GIS Systems & Services

Margaret.Herzog@bia.gov, (720) 484-3353

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## Bureau of Indian Affairs

### TRIBAL CLIMATE RESILIENCE PROGRAM



Program continues to expand! from 1 original Climate Coordinator

Rachael Novak became BIA first Climate Science Coordinator in DC in July 2015

Margaret Herzog, Denver, started February 2015 to build IT/GIS systems and services with Branch of Geospatial [BOGS support](#)

Three BIA Regional Climate Liaisons, Anchorage, AK  
Corballis, OR, and Tuscon, AZ, and likely will start by end of year

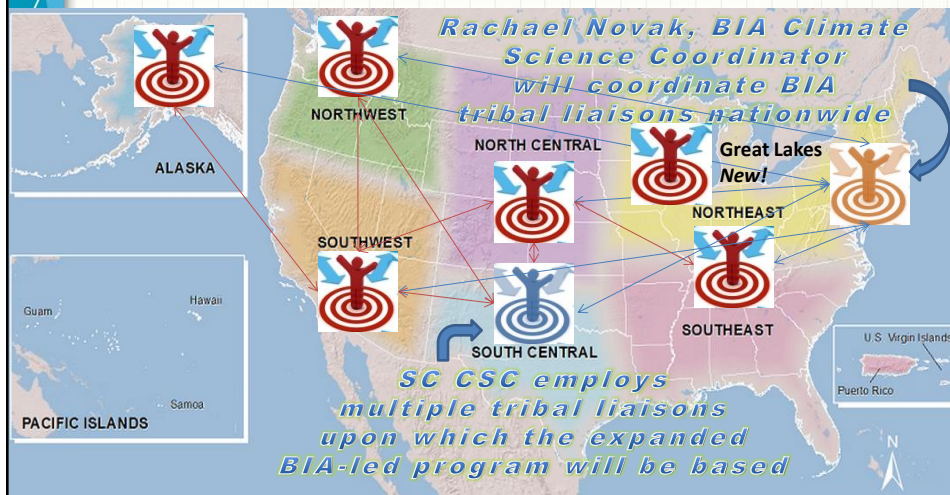
Three BIA Regional Climate Liaisons, for NC CSC, Midwest area, and NE/SE CSCs (BIA Eastern RO equivalent), will be selected shortly and likely start in early spring

## Bureau of Indian Affairs

### TRIBAL CLIMATE RESILIENCE PROGRAM



Six CSC tribal liaisons (in red) are being deployed soon!





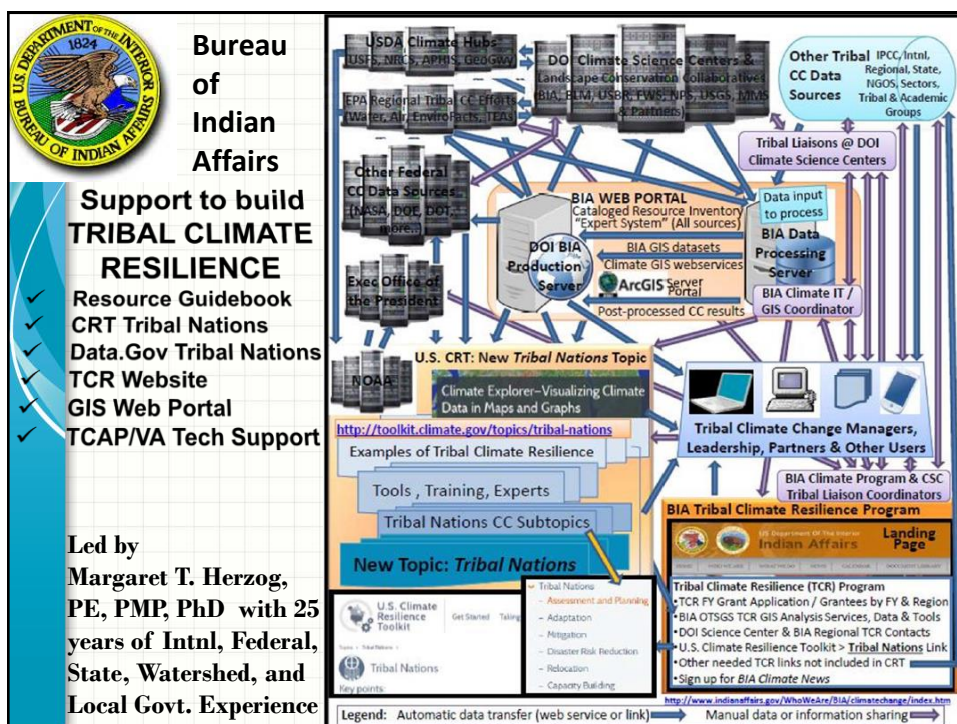
## Bureau of Indian Affairs

**Each RO has a designated climate contact**

**BIA Regional Offices, each includes a Regional Climate Contact!**

The map displays the following Regional Offices (RO) and their designated climate contacts:

- Northwest Region:** David Redhorse, NW RO ([david.redhorse@bia.gov](mailto:david.redhorse@bia.gov))
- Rocky Mountain Region:** Jarvis Gust, RM RO ([jarvis.gust@bia.gov](mailto:jarvis.gust@bia.gov))
- Midwest Region:** Diane Mann-Klagner, GPL RO ([diane.mann-klager@bia.gov](mailto:diane.mann-klager@bia.gov))
- Great Plains Region:** Matt Anderson, MID RO ([matthew.anderson@bia.gov](mailto:matthew.anderson@bia.gov))
- Southwest Region:** Joe Jojola, SW RO ([joseph.jojola@bia.gov](mailto:joseph.jojola@bia.gov))
- Western Region:** Chip Lewis, WES RO ([charles.lewis@bia.gov](mailto:charles.lewis@bia.gov))
- Pacific Region:** John Mosley, PAC RO ([john.mosley@bia.gov](mailto:john.mosley@bia.gov))
- Southwest Region:** Crystal Keys, SPL RO ([crystal.keys@bia.gov](mailto:crystal.keys@bia.gov))
- Southwest Region:** Miachael Miley, EOK RO ([michael.miley@bia.gov](mailto:michael.miley@bia.gov))
- Southern Plains Region:** Harold Peterson, EAS RO ([harold.peterson@bia.gov](mailto:harold.peterson@bia.gov))
- Southwest Region:** Harrilene Yazzie, NAV RO ([harrilene.yazzie@bia.gov](mailto:harrilene.yazzie@bia.gov))
- Alaska:** Mark Kahklen, AK RO ([Mark.Kahklen@bia.gov](mailto:Mark.Kahklen@bia.gov))





## Bureau of Indian Affairs

### Branch of Geospatial Services (BOGS)

**FREE!** ESRI GIS Licenses, Training, and Help Desk  
(BIA.gov > Category: *Geospatial*)

**ArcGIS Product List**  
The items in the ArcGIS [Product List](#) are available at no cost to approved applicants.  
System requirements for ArcGIS for Desktop versions  
Refer to [ESRI's System Requirements](#) for all versions of ArcGIS products.

**How to Obtain GIS Software**  
**New ELA members:** Contact the [BOGS Help Desk](#) for the [BOGS ELA Application Form](#) and a New Order Packet. An ELA coordinator will help you with your application.

**BOGS Geospatial Training**  
The **Geospatial Training Schedule** is available. The BOGS provides GIS training to BIA offices and employees of [Federally Recognized Tribes](#).

[BOGS Help Desk](#) 877.293.9494.


*BOGS also assists Margaret in [BIA Tribal Climate Web Portal](#) development!*

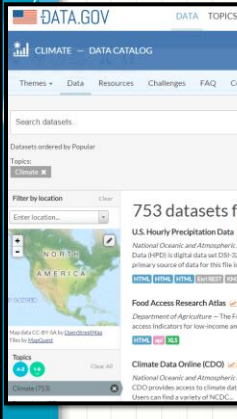


## MORE SUPPORT! Bureau of Indian Affairs

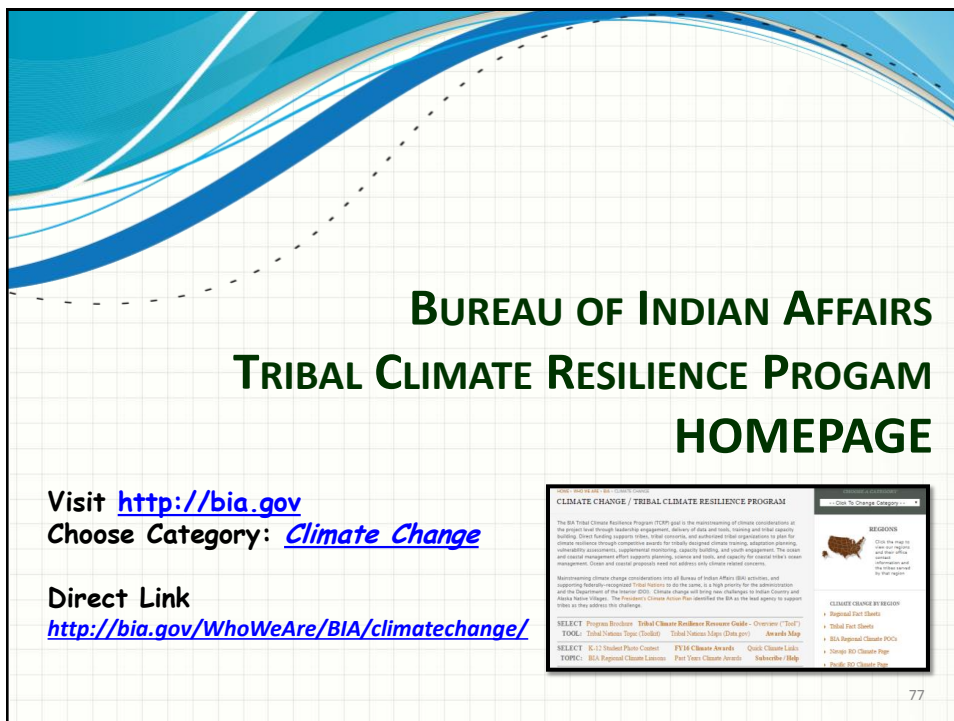
### TRIBAL CLIMATE RESILIENCE PROGRAM

Margaret can provide templates, climate data, resources, tools upon request to leverage awards and expand your support network





**SCHEDULE IN-PERSON TODAY OR A WEBEX WITH MARGARET ON THE SIGN-UP SHEET (OR TCRP [ONLINE FEEDBACK FORM](#)) FOR LATER**



## BUREAU OF INDIAN AFFAIRS TRIBAL CLIMATE RESILIENCE PROGRAM HOMEPAGE

Visit <http://bia.gov>  
Choose Category: [Climate Change](#)

Direct Link  
<http://bia.gov/WhoWeAre/BIA/climatechange/>

**CLIMATE CHANGE / TRIBAL CLIMATE RESILIENCE PROGRAM**

The BIA Tribal Climate Resilience Program (TCRP) goal is the mainstreaming of climate considerations at the project level through leadership engagement, delivery of data and tools, training and tribal capacity building. TCRP funding supports tribal, state, regional, and national tribal organizations to plan for climate resilience through competitive awards for tribally designed climate tracking, adaptation planning, vulnerability assessments, regionalized monitoring, capacity building, and youth engagement. The award and coastal management effort supports planning, science and tools, and capacity for coastal tribal's coastal management. Group and sector proposals need not address only climate-related concerns.

Streamlining climate change considerations into all Bureau of Indian Affairs (BIA) activities, and supporting federally-recognized Tribal Nations to do the same, is a top priority for the administration and the Department of the Interior (DOI). Climate change will bring new challenges to Indian Country and Alaska Native Villages. The President's Climate Action Plan identified the BIA as the lead agency to support tribes as they address this challenge.

**SELECT:** Program Overview | Tribal Climate Resilience Resource Guide - Overview ("Tool")  
**TOOL:** Tribal Climate Topic Checklist | Tribal Climate Topic Data | Assets Map  
**SELECT:** BIA Regional Climate Center | FY16 Climate Awards | Tribal Climate Center  
**TOPIC:** BIA Regional Climate Center | FY16 Climate Awards | Subsector | Help

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## Bureau of Indian Affairs TRIBAL CLIMATE RESILIENCE PROGRAM

<http://bia.gov> ➔ [Category: Climate Change](#)

WEDNESDAY AUGUST 12, 2015

US Department Of The Interior  
**Indian Affairs**

HOME | WHO WE ARE | WHAT WE DO | NEWS | CALENDAR | DOCUMENT LIBRARY | CONSULTATIONS | HOWDO I... | FAQs | JOBS

**News Release**

**Assistant Secretary Washburn Announces Approval of Fond du Lac Band of Lake Superior Chippewa's Probate Code**

Kevin K. Washburn  
Assistant Secretary  
Indian Affairs

**WHAT WE DO**

**SERVICES OVERVIEW**

The United States has a unique legal and political relationship with Indian tribes and Alaska Native entities as provided by the Constitution of the United States, treaties, court decisions and Federal statutes. Within the government-to-government relationship, Indian Affairs provides services directly or through contracts, grants, or compacts to 566 Federally recognized tribes.

[READ MORE](#)


**CHOOSE A CATEGORY**

- Click To Change Category --
- Click To Change Category --
- Budget & Finance
- Climate Change**
- Energy & Economic Development
- Education

NEWS | SOCIAL MEDIA

## Bureau of Indian Affairs

### TRIBAL CLIMATE RESILIENCE PROGRAM HOMEPAGE



- Select Tool
- Select Topic
- Region Links
- Agency Links
- Intertribal Links
- Climate Funding
- Photo Contest
- Liaisons
- Feedback / Subscribe

**CLIMATE CHANGE / TRIBAL CLIMATE RESILIENCE PROGRAM**


The BIA Tribal Climate Resilience Program (TCRP) goal is the mainstreaming of climate considerations at the project level through leadership engagement, delivery of data and tools, training and tribal capacity building. Direct funding supports tribes, tribal consortia, and authorized tribal organizations to plan for climate resilience through competitive awards for tribally designed climate training, adaptation planning, vulnerability assessments, supplemental monitoring, capacity building, and youth engagement. The ocean and coastal management effort supports planning, science and tools, and capacity for coastal tribe's ocean management. Ocean and coastal proposals need not address only climate-related concerns.

Mainstreaming climate change considerations into all Bureau of Indian Affairs (BIA) activities, and supporting federally-recognized Tribal Nations to do the same, is a high priority for the administration and the Department of the Interior (DOI). Climate change will bring new challenges to Indian Country and Alaska Native Villages. The President's Climate Action Plan identified the BIA as the lead agency to support tribes as they address this challenge.

**SELECT** Program Brochure Tribal Climate Resilience Resource Guide - Overview ("Tool")  
**TOOL:** Tribal Nations Topic (Toolkit) Tribal Nations Maps (Data.gov) Awards Map

**SELECT** K-12 Student Photo Contest FY16 Climate Awards Quick Climate Links  
**TOPIC:** BIA Regional Climate Liaisons Past Years Climate Awards [Subscribe / Help](#)

**Fall 2016 / Spring 2017 K-12 BIA/BIE TRIBAL STUDENT CLIMATE CHANGE PHOTO CONTEST**  
**Post Contest Winners and 2016 Summer Photos Entries**



**Due:** November 30th (2016 Fall Contest) / April 28th (2017 Spring Contest)  
 • For K-12 Students: Tribal Climate Change Photo Contest Instructions (PDF)  
 • For Instructors and Mentors: Additional Content and Climate Lesson Plan Guidance (PDF)  
 Using a classroom or cell phone camera, take a picture of something you value in your tribal community that climate change might affect. Include a caption describing the climate impact (and what might be done about it). Submit all captioned photos or questions by e-mail to: [bia\\_climate\\_photo\\_contest@bia.gov](mailto:bia_climate_photo_contest@bia.gov) or by teacher's class instructions. Categories: K-5, 6-8, & 9-12.  
 • 2015 Summer and Fall Tribal Student Photo Contest Award Winners (pdf)  
 • 2016 Spring Photo Contest Award Winners (pdf) - includes all entries, winners marked  
 • 2016 Summer Photo Contest Award Winners (pdf) - includes all entries, winners marked

**CLIMATE CHANGE BY REGION**


- Regional Fact Sheets
- Tribal Fact Sheets
- BIA Regional Climate POCs
- Navajo RO Climate Page
- Pacific RO Climate Page

**FEDERAL RESOURCES**

- Agency Fact Sheets
- Executive Order 13553
- Climate Action Plan
- Climate Change Indicators
- National Climate Assessment
- Climate Resilience Toolkit
- Climate Data and Maps
- Climate Adaptation Strategy
- DOI Climate Science Centers
- DOI Landscape Cooperatives
- EPA Climate Change
- EPA Tribal Portal

## Bureau of Indian Affairs

### TRIBAL CLIMATE RESILIENCE PROGRAM



**Current FY Climate Funding – Review last year's kit to prepare to apply! See past awards**

**FY 2016 Tribal Climate Resilience Program Awards**  
*Adaptation & Ocean/Coastal Planning, Travel Support, Youth Funding, and Capacity Building*

- [FY16 BIA TCRP Awards Summary \(pdf\)](#)
- [Indian Affairs FY16 BIA TCRP Awards Press Release \(pdf\)](#)

**Awards Announced 8/24/16:** The Bureau of Indian Affairs announced funding of more than \$8.6M to federally-recognized Tribes and Alaska Native communities for tribal climate change adaptation and capacity building, ocean and coastal management planning, and youth climate opportunities. Award/no-award letters were sent to tribal leaders with an email copy to original submitters in early August 2016. For an awards listing, please see the [FY16 BIA TCRP Awards Summary](#).

If you have questions or feedback about the proposal or review process, please submit it by email to [climate.funding@bia.gov](mailto:climate.funding@bia.gov).

**ORIGINAL FY16 SOLICITATION RESOURCES (Archive)**

- [FY16 Application Kit \(pdf\)](#) - Notice of Funding (proposal requirements)
- [\[Optional\] Proposal Cover Sheet \(fillable pdf\)](#) - to aid in correct filing!
- [Original FY16 Funding Announcement Letter sent to Tribal Leaders \(pdf\)](#)
- [Indian Affairs Climate Funding News Release posted 3/23/16 \(pdf\)](#)
- [BIA Regional Climate Contacts \(pdf\)](#)
- [Overview Webinar with Q&A \(YouTube\)](#) - Download slides (pdf)



# Bureau of Indian Affairs

## TRIBAL CLIMATE RESILIENCE PROGRAM

In June 2015, BIA Climate Program awarded nearly \$12M!

Over \$1M for interns/youth were awarded in August 2015!

Left Chart: Training & Workshops, Adaptation Planning, TCC Travel, Coastal Mgmt, Coastal Travel. Right Chart: Management Interns, Research Interns, Youth Engagement.

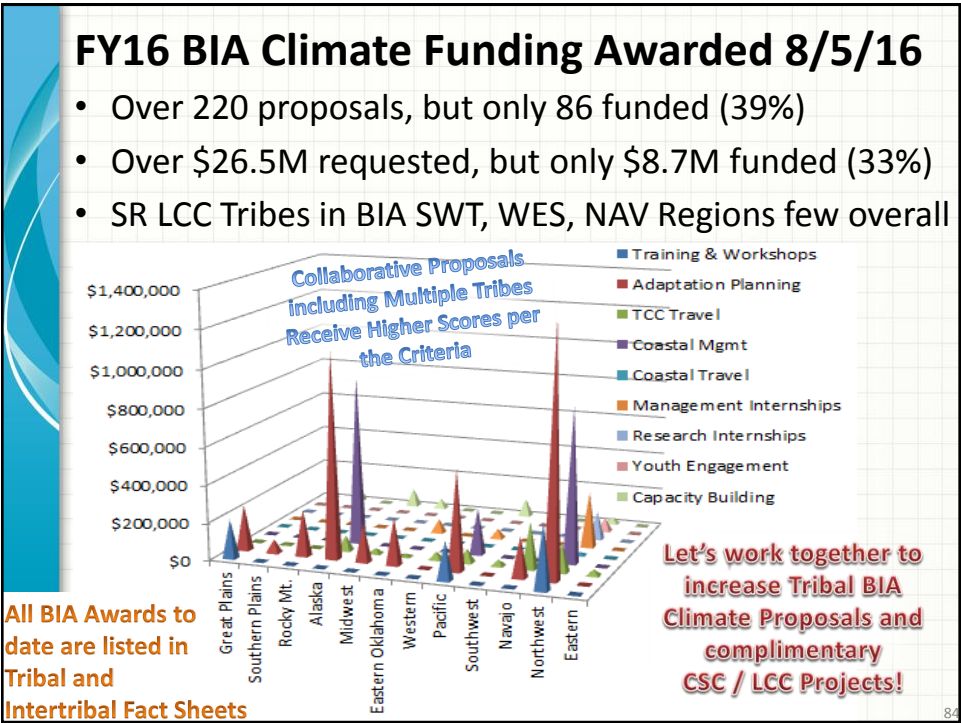
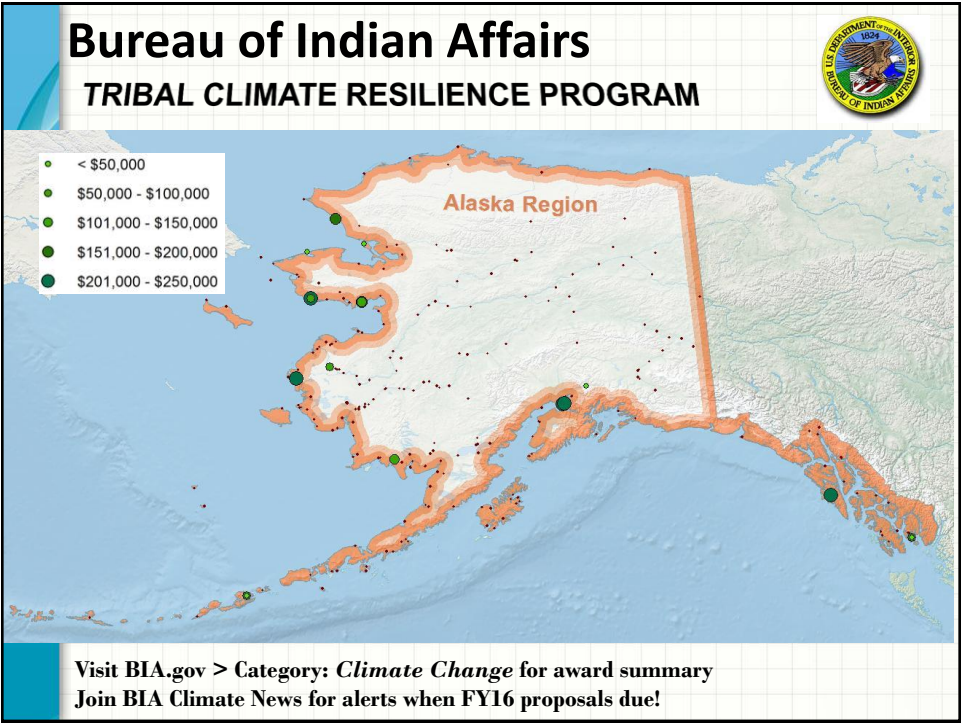
Visit [BIA.gov](http://BIA.gov) > Category: *Climate Change* for full award summary

Join BIA Climate News for alerts when FY16 proposals due!

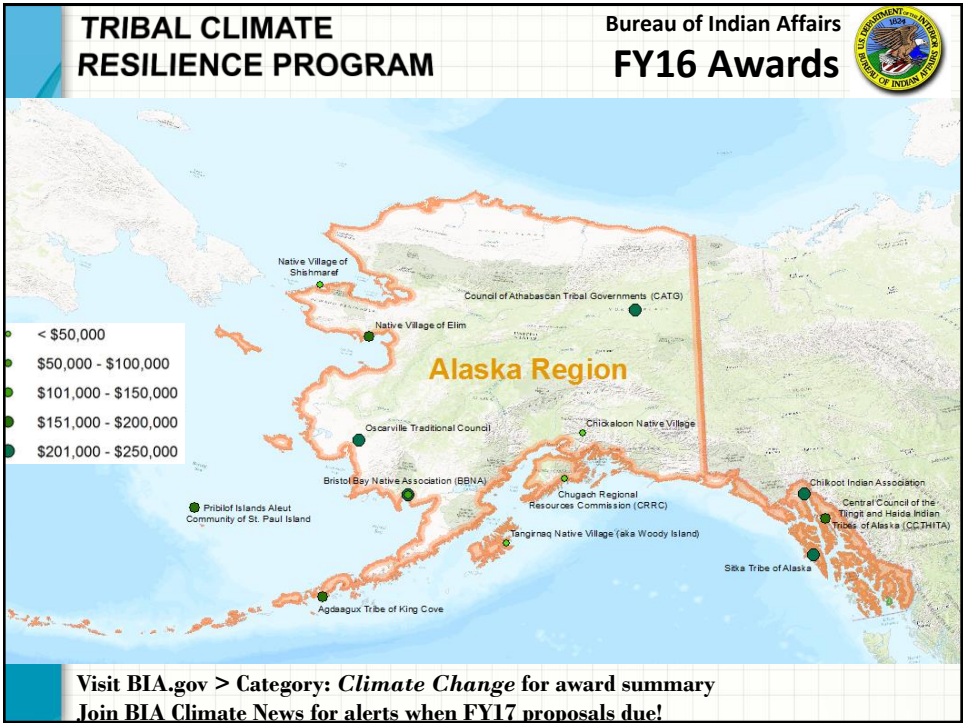
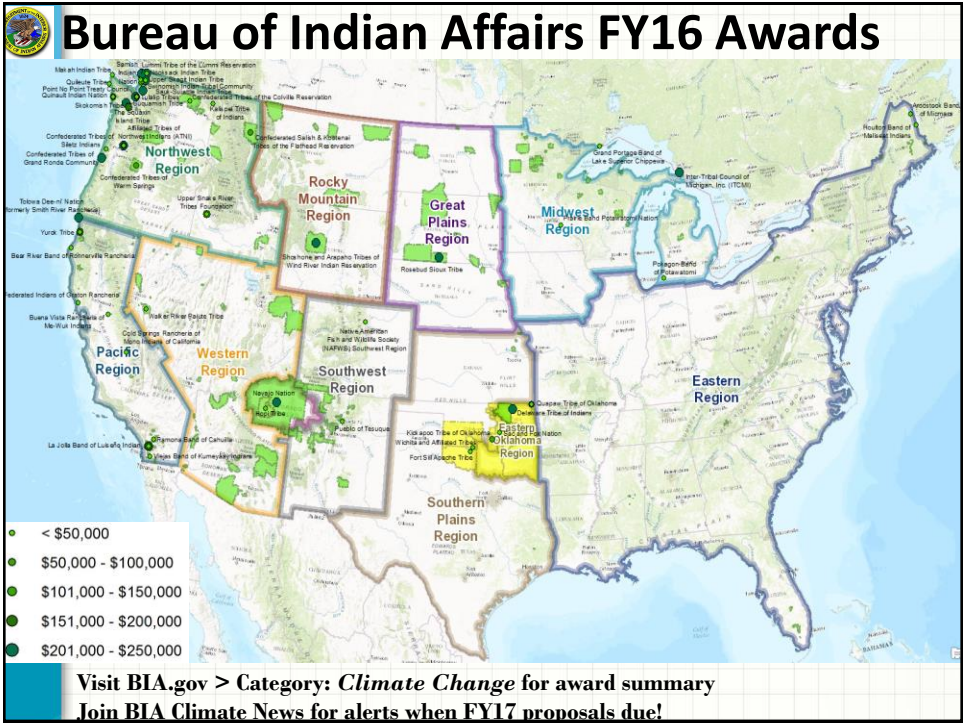
Legend: < \$50,000, \$50,000 - \$100,000, \$101,000 - \$150,000, \$151,000 - \$200,000, \$201,000 - \$250,000

Visit [BIA.gov](http://BIA.gov) > Category: *Climate Change* for award summary

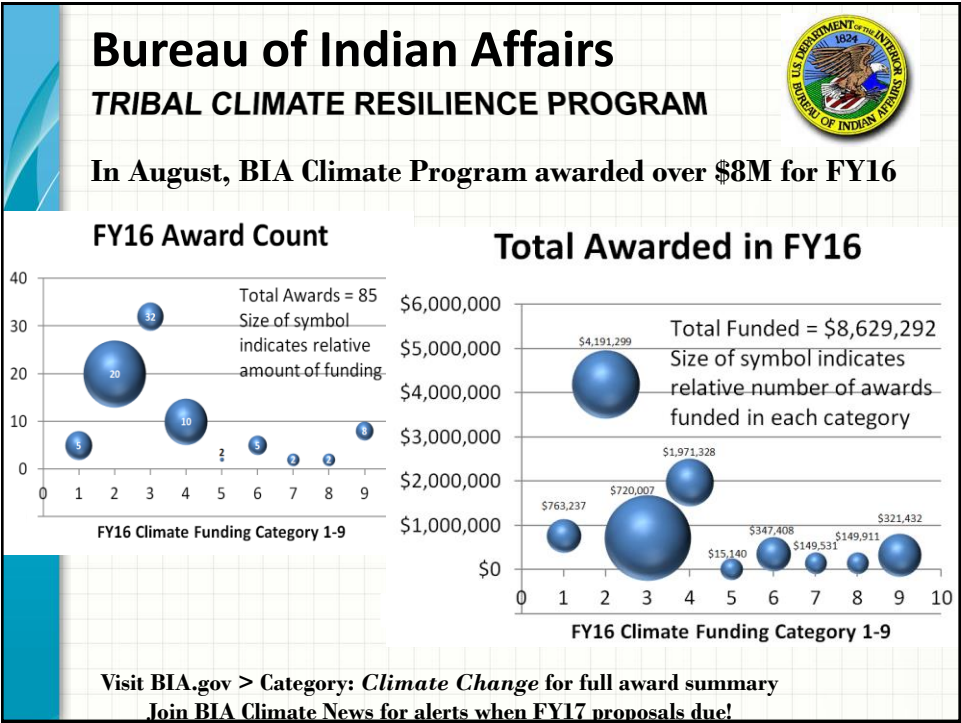
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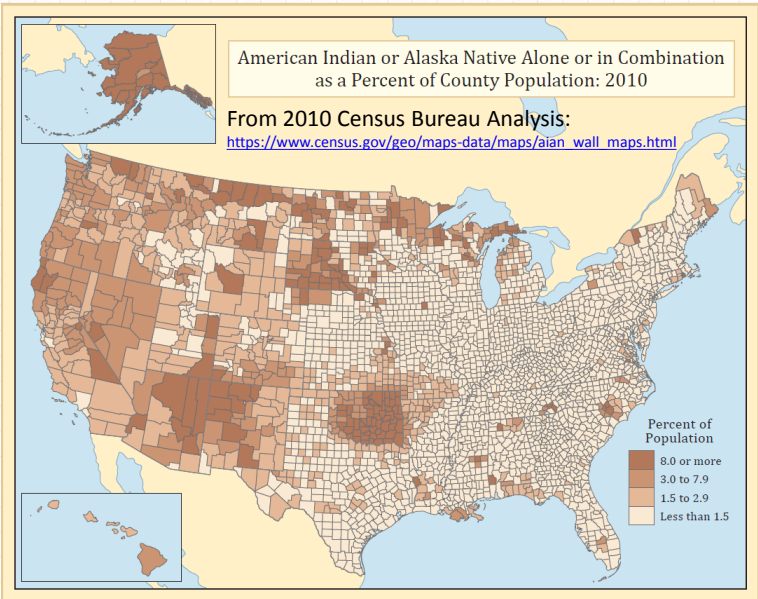




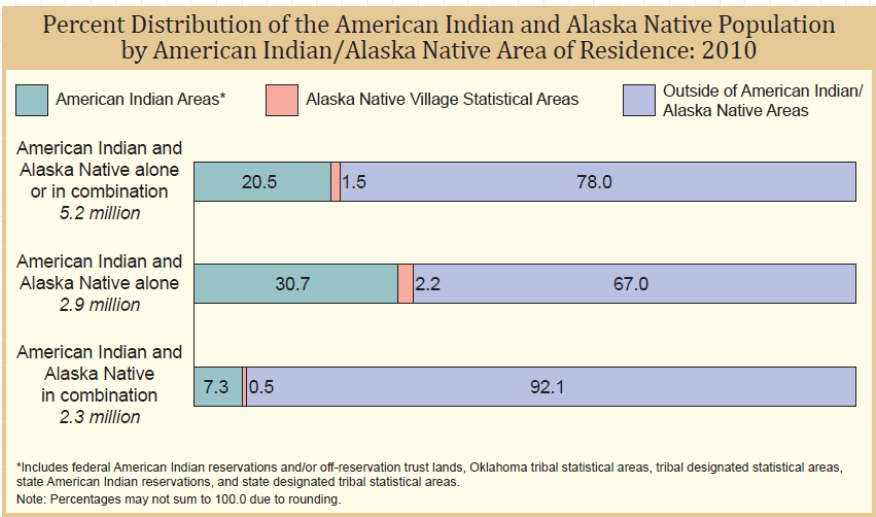




**Issue #1: Does BIA FY15 award distribution track concentrations of native populations?**



**Issue #2: How do we adequately reach the *majority* native populations residing off-reservation and going to public schools?**



From 2010 Census Bureau Analysis: [https://www.census.gov/geo/maps-data/maps/aian\\_wall\\_maps.html](https://www.census.gov/geo/maps-data/maps/aian_wall_maps.html)

## 4. CREATING AN AWARD WINNING CLIMATE PROPOSAL



### Steps for Winning an Award

- Obtain Climate Adaptation Training
- Attend Tribal Networking Meetings
- Review Climate Adaptation Plans
- Select an appropriate model with community input
- Discuss climate issues and emphasis with community and all other departments
- Find agency, inter-tribal, and local & state partners
- Associate with academic institution, non-profit, and / or private / public climate adaptation consultant
- Hire Climate Coordinator and volunteer support
- Continually work with all stakeholders as move forward



## Tips for Winning an Award

- Include short, alluring executive summary
- List a variety of partners
- Leverage other agency and group funds
- Provide Tribal Cost share
- Don't ask for maximum limit, if can do it for less, think about an iterative process, so just year-by-year need
- Detail budget and cost share for all items same sheet
- Make schedule and milestones clear
- List work products - an adaptation plan, vulnerability assessment, datasets, maps, etc.
- Provide resumes and letters of support
- Focus on community capacity building, not research

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## BIA Climate Program Highlights

- Federal agencies will work to improve coordinated tribal support
- BIA is the designated federal lead agency to support tribes
- **BIA Climate Coordinator** position is currently vacant
- BIA Climate Website, News, Portal, Services, Network Expanding
- BIA placing tribal liaisons in DOI Climate Science Centers (CSCs)
- Join! Your DOI Landscape Conservation Cooperatives (LCCs) and Free! TCUs may join Cooperative Ecosystem Studies Units
- **Join!** BIA Climate News to know when to  
**APPLY!** for FY17 Climate Funding

Contact [Margaret.Herzog@bia.gov](mailto:Margaret.Herzog@bia.gov) (720) 484-3353 to schedule a WebEx for climate tools, resources, or mapping / modeling needs

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## Part 2. Getting the most out of the *Tribal Climate Resilience Program & Guide* *Federal-wide Climate Tools and Resources*



Margaret Herzog, PE, PMP, PhD

BIA TCRP IT/GIS Systems and Services

R9 Tribal EPA Conference, Session 1 of 2

Wednesday, 10/23/16 1:30-2:30PM

## Start at the TCR Resource Guide (Landing Page)

<http://toolkit.climate.gov/tribal>



From the [Tribal Climate Resilience Resource Guide Landing Page](#), select one of the eight topics (circles) to explore resources. Choose [Agencies](#), [Regions](#), or [Tribes](#) to visit specific listings or choose a topical webpage: [Youth](#), [Funding](#), [Training](#), [Planning](#), or [Traditional Knowledges \(TKs\) / Traditional Ecological Knowledge \(TEK\)](#).

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## TCR Resource Guide Listing Pages – 2. Regions

**REGIONS**

**Tribal Climate Resilience Resources  
BIA Regions**

Alaska Region | Eastern Region | Eastern Oklahoma Region | Great Plains Region | Midwest Region | Navajo Region  
Northwest Region | Rocky Mountain Region | Pacific Region | Southern Plains Region | Southwest Region | Western Region

To provide more site-specific information, resources are also organized by BIA region, since each Tribe in the U.S. is associated with a BIA service area. Select the region for your tribe to access federal-wide support for that area of interest.

About

Contact Us / Provide Feedback

## Jump to BIA Region Fact Sheet – PAC Example

**Tribal Climate Resilience Resources - REGIONAL CLIMATE RESOURCES**

**PACIFIC REGION (PAC RO) FACT SHEET**

**BIA Region: Pacific Regional Fact Sheet**

Pacific Regional Office

**Description of Region:**

The BIA Pacific Regional Office is committed to supporting the 104 federally recognized Tribes in California within its jurisdiction to address new challenges presented by the current rate of global climate change. The diverse missions of all branches of the BIA that have joined together to address climate change are the strength of the Pacific Region strategy. In addition to resources presented here, the Region will utilize its network of partners and tribal contacts to disseminate climate change information to Tribes within the Region.

**Federal Links:** Select the Agency Acronym for the full Agency Fact Sheet and the link to its right for a more specific regional contact or homepage. Choose Affiliated Tribal Fact Sheets to access a Fact Sheet for each Tribe in this Region.

<b>BIA Pacific - Affiliated Tribal Fact Sheets</b>	<b>DOT/FWHA:</b> Western	<b>DOE CA:</b>
<b>BOEM:</b> Pacific Coast	<b>BLM:</b> CA	<b>FWS:</b> Pacific Southwest
<b>EPA:</b> R9	<b>FEMA:</b> R9	<b>HUD:</b> Southwest
<b>USDA CLIMATE HUB:</b> Southwest	<b>USDA NRCS:</b> Locator, <b>USDA USFS:</b> Pacific Southwest	<b>NOAA:</b> Region, <b>RISA:</b> CNAP
<b>CSC:</b> Northwest	<b>LCC(s):</b> California, Desert, North Pacific	

**Services**

- CA Indian Legal Services
- CA State Climate Change Adaptation
- CA State Tribal Advisor By Dept.
- CA Tribal Temp. Asst. For Needy Families
- Tribal Climate Resilience Program (BIA)
- Tribal Government Climate Support (EPG)
- NIDIS Tribal Engagement (Drought Portal)
- Native One Stop Resource Finder

**Funding**

- Tribal Funding By Strategy
- Other Funding Opportunities (TCCG) - Choose Geography: SW And Any

**Tools**

- Cal-Adapt Climate Tools And Data Access
- California LCC Climate Commons
- Central And N. CA Ocean Observing System
- NOAA: Western Regional Climate Center Analysis
- CRT Tool: Guidelines For Considering Traditional Knowledge In Climate Change Initiatives
- CRT Tool: Tribal Climate Change Guide (TCCG)

**Training**

- 2016 CA Adaptation Forum
- Tribal Climate Adaptation Workshop
- Tribal Climate Change Adaptation Planning

**Examples**

- CRT Story: The Blue Lake Rancheria Tribe Undertakes Innovative Action To Reduce The Causes Of Climate Change
- Nationwide Tribal Climate Case Studies

**Regional Groups**

- CA LCC Tribal Team
- Inter-Tribal Council Of California (ITCC)
- NNCAP SW Tribal CC Network

**Products**

- CA Adaptation Planning Guide (2012)
- CA Invasive Plant Council Herbicide BMPs
- EPA: Climate Impacts In The Southwest
- NCA Regions: Southwest Climate Assessment
- Traditional Ecological Knowledge (TEK) Resources
- Tribal Nations Theme In Climate Data Initiative

Select Pacific- area Federal Resources or access area Tribal Fact Sheets to compare

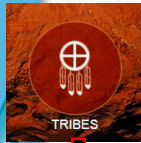
Contact Us / Provide Feedback

Contact Us / Provide Feedback

Questions? Contact Margaret T. Herzog, PE, PMP, PhD  
BIA Climate Program, IT / GIS Systems & Services  
Margaret.Herzog@bia.gov, (720) 484-3353

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# Find Your Tribal Fact Sheet

1) Choose TRIBES icon

2) Jump to Tribe by entering 3-4 distinct letters from Tribe Name in Quick Filter

## Tribal Climate Change Resources

Tribes

TCUs

Intertribal Groups

Tribes

TCUs

Intertribal Groups

Show 100 entries

Tribes	BIA Region	State	Fact Sheet
Paiute Indian Tribe of Utah (Cedar, Kanosh, Koosharem, Indian Peaks, & Shivwits)	Western Region	Utah	Fact Sheet

Showing 1 to 1 of 1 entries (filtered from 577 total entries)

Previous

1

Next

3) Choose Tribal Fact Sheet of Interest

### Names (Federal Register): Paiute Indian Tribe of Utah (Cedar Band of Paiutes, Kanosh Band of Paiutes, Koosharem Band of Paiutes, Indian Peaks Band of Paiutes, and Shivwits Band of Paiutes)

Federal Links: Select the Agency Acronym (blue link) for an Agency Fact Sheet and the orange link to its right for regional contacts or homepage.  
For more information, hover over a link for agency or program details before making a selection.

Tribal: <a href="#">Official Website (or groupsite)</a>	BIA Region: <a href="#">Western Regional Fact Sheet</a>	DOE: <a href="#">UT</a>
CSC: <a href="#">Southwest</a>	LCC: <a href="#">Southern Rockies</a>	FWS: <a href="#">Mountain Prairie</a>

# Tribal Climate Fact Sheet

## Your dashboard to Resources!

Agency Support

- Blue - Agency Fact Sheet
- Orange – Regional Agency Link

### Names (Federal Register): Navajo Nation, Arizona, New Mexico & Utah

Federal Links: Select the Agency Acronym (blue link) for an Agency Fact Sheet and the orange link to its right for regional contacts or homepage.  
For more information, hover over a link for agency or program details before making a selection.

Tribal: <a href="#">Official Website (or groupsite)</a>	BIA Region: <a href="#">Navajo Regional Fact Sheet</a>	DOE: <a href="#">AZ</a>
CSC: <a href="#">Southwest</a>	LCC: <a href="#">Southern Rockies</a>	FWS: <a href="#">Southwest</a>
USDA CLIMATE HUB: <a href="#">Southwest</a>	USDA NRCS: <a href="#">Locator</a> , <a href="#">USDA USFS: Southwestern</a>	NOAA: <a href="#">Region</a> , <a href="#">RISA: CLIMAS</a>
EPA: <a href="#">R9</a>	FEMA: <a href="#">R9</a>	HUD: <a href="#">Southwest</a>

#### Awards

- FY11 Climate Adaptation Planning
- FY15 Management Internships
- FY15 Travel (Climate)
- FY15 Youth Engagement
- FY16 Climate Adaptation Planning
- FY16 Travel (Climate)
- More Climate Funding Options

#### Groups Find Regional Partners & TCUs!

- Dine College
- Navajo Technical College

#### Request Personal Tour!

[Contact Us / Provide Feedback](#)

#### Documents Share Results!

- Connectivity of Habitats on Navajo Nation Lands
- SR LCC Result!
- Considerations for Climate Change and Variability Adaptation on the Navajo Nation
- NN CC Vulnerability Assessment for Priority Wildlife Species

#### Tools

- Tribal Drought Information for Monitoring, Assessment, and Planning (DRI MAP)
- CRT Tool: Guidelines for Considering Traditional Knowledges in Climate Change Initiatives
- CRT Tool: Tribal Climate Change Guide
- CRT Tool: Tribal Climate Change Adaptation Planning Toolkit
- Other Recommended Climate Tools
- Native One Stop: Federal Programs

#### Examples

- CRT Case Study: Navajo Nation: Hotter, Drier Climate Puts Sand Dunes on the Move
- ITEP TCC Profile: Dune Study Offers Clues to Climate Change
- Other Tribal Nations Examples

#### Data & Maps LCC Atlas

- Conservation Planning Atlas
- HUC8: 15020013 - Polacca Wash Resource Links
- NN Zoo: Facts on Desert Bighorn Sheep and Other Species
- Tribal Nations Geospatial Data
- Tribal Nations Map Gallery

#### Climate Data Links

Questions? Contact Margaret T. Herzog, PE, PMP, PhD

BIA Climate Program, IT / GIS Systems & Services

Margaret.Herzog@bia.gov, (720) 484-3353

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## Intertribal Fact Sheets: *Examples – BBNA & GLIFWC*

Group Name: *Bristol Bay Native Association*

Type: Tribal Group    Region: Alaska    Group: Website    Additional Focus: Website Details

Description: Alaska Native Association or Nonprofit formed when ANSCA Native Corporation was provided to provide government services for community health and well being. Bristol Bay Native Association, Inc. is a Tribal Consortium, made up of 31 Tribes and is organized as a non-profit corporation to provide a variety of educational, social, economic and related services to the Native people of the Bristol Bay region of Alaska. The Mission of BBNA is to maintain and promote a strong regional organization supported by the Tribes of Bristol Bay to serve as a unified voice to provide social, economic, cultural, educational opportunities and initiatives to benefit the Tribes and the Native people of Bristol Bay in SW Alaska. BBNA's Natural Resource Programs protect the rights of Bristol Bay villages to choose how to continue to meet their subsistence, cultural, and economic needs. Consistent with solid stewardship, sustainability and self-reliance, the program helps advance our village's natural resource management goals.

Awards

- Ocean and Coastal Management Planning for Practical Methods for Bristol Bay Villages to Document and Plan for Climate Change

Affiliated Tribes

- Koliganek (New Koliganek Village Council)
- Perryville (Native Village)

Documents

- BBNA Implementation Strategy, Recovery, and other regional energy plans

Tools

Examples

- Partner on: Assessing the Timing and Extent of Coastal Change in Western Alaska

Data & Maps

Intertribal Climate Resilience Fact Sheet

Great Lakes Indian F&W Commission

Group Name: *Great Lakes Indian F&W Commission*

Type: Tribal Group    Region: Great Lakes    Group: Website    Additional Focus: Website Details

Description: The Great Lakes Indian Fish & Wildlife Commission is commonly known by its acronym, GLIFWC. Formed in 1984, GLIFWC represents eleven Ojibwe tribes in Minnesota, Wisconsin, and Michigan who reserved hunting, fishing and gathering rights in the 1837, 1842, and 1854 Treaties with the United States government. GLIFWC provides natural resource management expertise, conservation enforcement, legal and policy analysis, and public information services in support of the exercise of treaty rights during well-regulated, off-reservation seasons throughout the treaty ceded territories. GLIFWC is guided by its Board of Commissioners along with two standing committees, the Voigt Intertribal Task Force and the Great Lakes Fisheries Committee, which advise the Board on policy.

Awards

Documents

Examples

Affiliated Tribes

Tools

- CRT Tool: G-WOW Guiding for Tomorrow: Changing Climate, Changing Culture

Data & Maps

- GLIFWC Map of Ceded Tribal Territories

Intertribal Groups include Sections for Member Tribes - with links back to their Fact Sheets! + Tools, Data & Maps, Awards, Examples, and Climate Documents

## From Agency Section of Tribal Fact Sheet

## Jump to Agency Fact Sheet (blue link)–LCCs

Federal Links: Tribal Climate Resilience Resources - AGENCY CLIMATE RESOURCES

LCCs: Southern Rockies

Landscape Conservation Cooperatives (LCCs) FACT SHEET

Orientation

Landscape Conservation Cooperatives (LCCs) help Tribal Nations build connections with partners to tackle large-scale and long-term conservation challenges.

Services

- CA LCC Tribal Team
- GB LCC: Tribal Resources
- Landscape Conservation Cooperatives (LCCs)
- LCC Council Tribal Representatives
- LCC News
- Partners With National Fish Habitat Partnership
- SR LCC Tribal Steering Committee Members

Products

- Arctic LCC Maps & Datasets
- Desert LCC Conservation Planning Atlas
- LCC Network Conservation Science Plan (2015)
- NCA3 Sectors: Landuse And Land Cover Change
- NP LCC S-TEK Strategy Documents
- Presentations & Posters
- Regional LCC Annual Reports

Funding

- LCC Funding Opportunities (+ Join One To Coproduce Projects)
- TCCG - Possible LCC Funding Opportunities

Tools

- CRT Tool Partner For: Coastal Change Analyses For Western Alaska: Interactive Map
- CRT Tool Partner For: Guidelines For Considering Traditional Knowledge In Climate Change Initiatives
- CRT Tool Partner For: Indigenous Health Indicators Tool
- CRT Tool Partner For: Local Environmental Observer (LEO) Network
- CRT Tool Partner For: National Fish, Wildlife, And Plants Climate Adaptation Strategy
- CRT Tool Partner For: Tribal Climate Change Guide
- Find My Landscape Conservation Cooperative
- LCC Nationwide Project Search

Training

- CA LCC: Webinar Recordings
- Evaluating Scenario Planning To Understand Climate Change
- GB LCC: Sagebrush Ecosystem Conservation
- GN LCC: ITEP TCCAP Course April 2016

Examples

- CRT Partner On: Assessing The Timing And Extent Of Coastal Change In Western Alaska
- CRT Partner On: Confederated Salish And Kootenai Tribes: Applying The Values Taught By Our Ancestors
- CRT Partner On: The Swinomish Indian Tribal Community Prepares For Climate Change Impacts
- GN LCC: Connecting Tribal And First Nation Adaptive Management And Climate Related Activities In The Crown Of The Continent

NFWPCAS excellent CAP Resource to Enhance Species!


Great overview of a variety of Tribes & Climate resources from each Agency Selected to Explore!

Questions? Contact Margaret T. Herzog, PE, PMP, PhD


BIA Climate Program, IT / GIS Systems & Services

Margaret.Herzog@bia.gov, (720) 484-3353

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# Traditional Knowledges / Traditional Ecological Knowledge Integration



## Tribal Climate Resilience Resources

### Traditional Knowledges / Traditional Ecological Knowledge

### Orientation

**Guidelines for Considering Traditional Knowledges in Climate Change Initiatives** will help protect knowledge and holders of TKs

Indigenous traditional knowledges (TKs) have emerged in national and international arenas as rich information for indigenous and non-indigenous climate assessments, policies, and adaptation strategies. With this growing recognition, however, comes potential risks to indigenous peoples in sharing TKs in federal and other non-indigenous climate change initiatives. These resources assist Tribes, Agencies, and other Partners build respectful, complimentary efforts together

#### Guidance

- Tribal Nations Summary and References
- Guidelines for TK, Primer, Ethics Essay in Toolkit**
- NP-NH Climate Change Workshop II Report
- First Stewards 2012 Witness Report
- Rising Voices Reports and Outcomes
- AIAN Guide to Build Cultural Awareness

#### Research Papers

- CMN SDI Model
- Best of 2 Worlds: TEK in ESB Management
- CC and Indigenous Peoples in the U.S.
- Guarding Against Exploitation: TEK & CC
- Engagement that Honors TKs
- TCOG Publications
- IPCC Portal Publications - Books

#### Federal TEK Awareness

- ACCNRS TK Guidelines and Primer - Summaries
- CC Through an Intersectional Lens
- USFS Exploring Role of TEK in CC Initiatives
- USFS Briding the Gape that Divide
- US FWS Basic TEK Info
- NIH TEK and Its Value for EHS
- NIH TEK Workshop Day 2
- EPA Using TEK to Adapt to CC
- EPA TSC: TEK in Policy and Decision Making
- NOAA TEK and CC Impacts
- NPS Integrating TEK into NRM
- Tribal Engagement in CSCs and

#### Examples

- CMN SDI Model to Inform Climate Initiatives

#### Videos

- Brads of Truth, Part Two: Climate Change
- ITPE: Adapting to Change

When working with Tribal Nations, federal and academic projects and partners are often enriched by the deeply integrated understanding of the relationships among all living things that indigenous people have honed since time immemorial. This may lead to breakthroughs in adaptation through keen natural observations, unique perceptions, and a focus on harmonious ways. Learn more with [TKs/TEK](#) links!

# ArcOnline: Interactive Story Maps

**Alaska Natives, Climate Factors, and Resilience**

Rising Temperature Sea Ice Tundra Greenness Coastal Shifting and Invasive Species

This Map demonstrates where imperiled communities are located according to USACE baseline erosion studies conducted 2006-2008 confirmed in a 2009 GAO report. Select a community to

**Names (Federal Register): Newtok Village**

**Federal Links:** Select the Agency Acronym for the full Agency Fact Sheet and the link to the right for a more specific: regional contact or homepage.

Tribal: Official Website (or group(s))	RIA Region: Alaska Regional Fact Sheet	DOE: AK
CSC: Alaska	Alaska Regional Office	FWS: Alaska
USDA CLIMATE HUB: Pacific Northwest	LCC: Western Alaska	NDA: Region, RISA: ACCAP
EPA: R10	USDA NRCS: Local, USDA USFS: Alaska	HUD: Alaska

**Awards**

- ACCOMP Community Planning Grant for Newtok

**Groups**

- Association of Village Council Presidents
- Calista Corporation

**Documents**

- Alaska Community Coastal Protection Project (ACCP): Newtok Planning Group
- GAO 2009 Imperiled Community Identified by USACE
- USACE 2009 Priority Action Report

**Tools**

**Examples**

- CAKEX Case Study: Relocating Newtok due to Coastal Erosion
- Newtok Village: It's Happening Now... The Village is Sinking
- UA Research: A Migratory House for Villagers on the Move

**Data & Maps**

- SNAP Community Climate Charits

**Tribal Information**

Name	Newtok Village
Short Name	Newtok
LCC Name	Western Alaska
Fact Sheet	<a href="#">More info</a>
GAO Imperil	-1
Identified	USACE

Access to TCR Resources from Interactive Map and back from Data & Maps of each Tribal Fact Sheet



## BIA GIS Web Portal: Awards Map – new!

**Tribe or Group Name:** Walker River Paiute Tribe of the Walker River Reservation, Nevada

**Total Amount Funded:** \$147363

**Number of Awards:** 4

**Award Details + Climate Resources:** [Fact Sheet](#)

**Names (Federal Register):** Newtok Village

**Federal Links:** Select the Agency Acronym for the full Agency Fact Sheet and the link to its right for a more specific regional contact or message.

<b>Tribal Official Website (or groups):</b>	<b>BIA Region:</b> Alaska Regional Fact Sheet	<b>DOE:</b> AK
<b>CSC:</b> Alaska	<b>LCC:</b> Western Alaska	<b>FWS:</b> Alaska
<b>USDA CLIMATE HUB:</b> Pacific Northwest	<b>USDA NRCS Locator:</b> USDA USFS: Alaska	<b>NOAA:</b> Region, RISA, ACCAP
<b>EPA:</b> R10	<b>FEMA:</b> R10	<b>HUD:</b> Alaska

**Awards**

- ACCAMP Community Planning Grant for Newtok

**Documents**

- Alaska Community Coastal Protection Project (ACCAPP) Newtok Planning Group
- GAO 2009 Impaired Community Identified by USACE
- URACE 2009 Priority Action Report

**Examples**

- CAREX Case Study: Relocating Newtok due to Coastal Erosion
- News Article: It's Happening Now: The Village is Sinking
- UA Research: A Migratory House for Villages on the Move

**Groups**

- Association of Village Council Presidents
- Calista Corporation

**Tools**

**Data & Maps**

- SNAP Community Climate Change Historical & Projected Temperature &

See new Awards Map in list of Tools at the top of the BIA TCRP homepage! Access to TCR Resources from Interactive Map and back from Data & Maps of each Tribal Fact Sheet

## BIA GIS Web Portal – Regional Climate Maps (to-order scalable)

**Indian Lands in the Northwest Region**

Scale 1:1,120,000

This map was created by the Bureau of Indian Affairs (BIA) Office of Trust Services (OTS) Division of Land Titles and Records (DLTR) Branch of Geospatial Support (BOGS) Lakewood, CO Plot Date: January 2016

Legend:

- City
- Federally Recognized Tribal Entity
- Water Body

Questions? Contact Margaret T. Herzog, PE, PMP, PhD  
BIA Climate Program, IT / GIS Systems & Services  
[Margaret.Herzog@bia.gov](mailto:Margaret.Herzog@bia.gov), (720) 484-3353

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U.S. Climate Resilience Toolkit

Get Started

Taking Action

Tools

About

Contact

Funding Opportunities

FAQ

Search

Topics > Tribal Nations >

Tribal Nations

Key points:

- Climate change impacts are projected to be especially severe for many of the 567 federally recognized tribes in the United States that depend on traditional places, foods, and lifestyles.

Jump from Tribal Fact Sheet to Tribal Nations by selecting an Example or Tool!

TRIBAL NATIONS & ARCTIC TOPICS

IN THE U.S. CLIMATE RESILIENCE TOOLKIT

<http://toolkit.climate.gov/topics/tribal-nations>

<https://toolkit.climate.gov/topics/arctic>

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Taking Action

Clear Filters

Filter by climate threat/stressor: ▼

Filter by parent topic: ▼

Filter by steps to resilience: ▼

Filter by region: ▼

Communities and businesses are taking action to reduce their vulnerability to climate-related impacts and to build resilience to extreme events. The stories below illustrate the application of the process and tools featured in this Toolkit. Browse the stories, or filter by topic, step to resilience, and/or region in the boxes above. To expand your results, click the Clear Filters link.



Yukon Delta Villages Document Baseline Environmental Data

Students and community residents of four remote Alaskan villages measure environmental data to identify their climate vulnerabilities.

[Read more >](#)



Looking to the Future on Alaska's North Slope

As ice retreats and energy resources along Alaska's North Slope become more accessible, diverse stakeholders consider potential futures and develop a science-informed view of the implications of development in the region.

[Read more >](#)



Quinault Indian Nation Plans for Village Relocation

As the threats of tsunami and sea level rise are joined by real and potential climate impacts, the Quinault community looks to move the lower village of Taholah to higher ground.

[Read more >](#)



Relocating Kivalina

Rising seas and coastal erosion are eating away at the barrier island on which the Alaska Native Village of Kivalina rests. Residents and others are making concerted efforts to move the community to safety.

[Read more >](#)



Navajo Nation: Hotter, Drier



Preparing to Respond to Oil



Suquamish Build Resilience



Confederated Salish and

Case Studies of Resilience in Action!

Nationwide, any Tribe or Tribal Group can share to encourage others!!

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Questions? Contact Margaret T. Herzog, PE, PMP, PhD

BIA Climate Program, IT / GIS Systems & Services

Margaret.Herzog@bia.gov, (720) 484-3353

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## Tribal Nations Cases –Sidebar Links

Steps to Resilience:

✓ Step 1: Identify the Problem

✓ Step 2: Determine Vulnerabilities

✓ Step 3: Investigate Options

➔ Step 4: Evaluate Risks & Costs

Step 5: Take Action

Tools:

Guidelines for Considering Traditional Knowledges in Climate Change Initiatives >

Local Environmental Observer (LEO) Network >

Scenarios Network for Alaska + Arctic Planning (SNAP) Tools >

Seven Generations–Community-Based Environmental Planning >

Topic:

Arctic > Arctic Oceans, Sea Ice, and Coasts >

Coastal Flood Risk > Coastal Erosion >

Tribal Nations > Disaster Risk Reduction >

Tribal Nations > Relocation >

Relocating Kivalina

Rising seas and coastal erosion are eating away at the barrier island on which the Alaska Native Village of Kivalina rests. Residents and others are making concerted efforts to move the community to safety.

Additional Resources:

ANTHC | Climate Change in Kivalina, Alaska: Strategies for Community Health (PDF) >

Re-Locate Kivalina | Re-Locate Receives 2015 ArtPlace America Grant >

Alaska Community Coastal Protection Project | Kivalina Project Page >

U.S. Army Corps of Engineers | Relocation Planning Project Master Plan for Kivalina, Alaska (PDF) >

Partners:

Native Village of Kivalina >

Kivalina Relocation Planning Committee >

U.S. Army Corps of Engineers | Alaska District >

U.S. Bureau of Indian Affairs >

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**Sidebar links to each Case provide Rich Resources**

Stage of progress, Topical Cross-links, Resources, Data, & Partners

## Tribal Nations: Climate Explorer

CLIMATE EXPLORER

TOPICS:

Water Resources

Climate Stressors

Current Drought

People and Assets Impacted

Social Vulnerability Index

Population Density (2000)

Land Cover (2011)

LAYER INFORMATION

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**Scroll to bottom of Tribal Nations Cases to Explore Map**

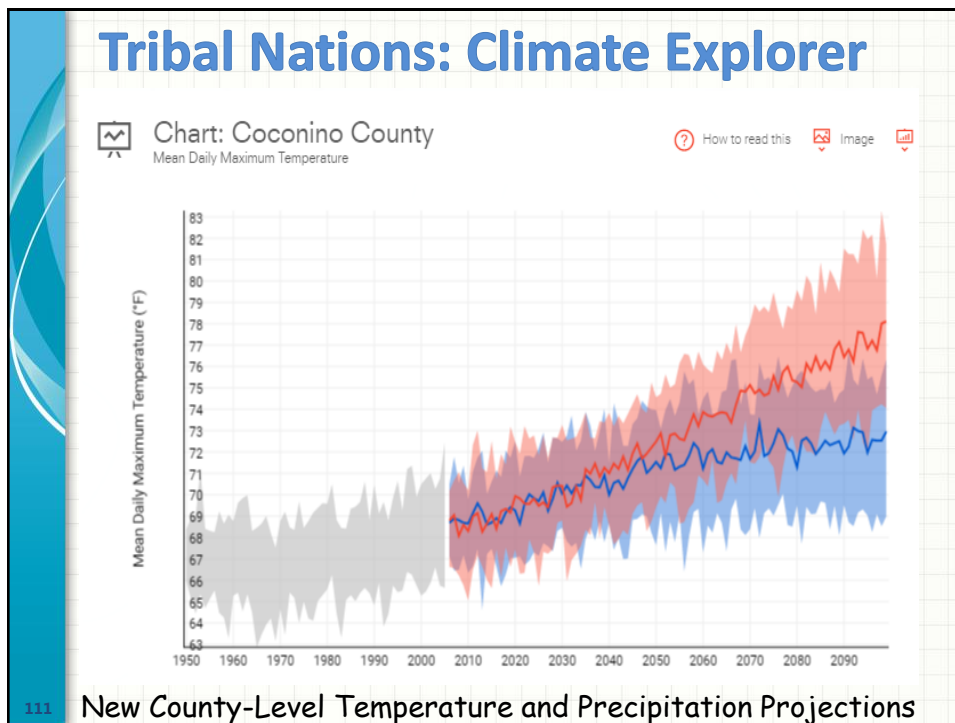
Questions? Contact Margaret T. Herzog, PE, PMP, PhD

BIA Climate Program, IT / GIS Systems & Services

Margaret.Herzog@bia.gov, (720) 484-3353

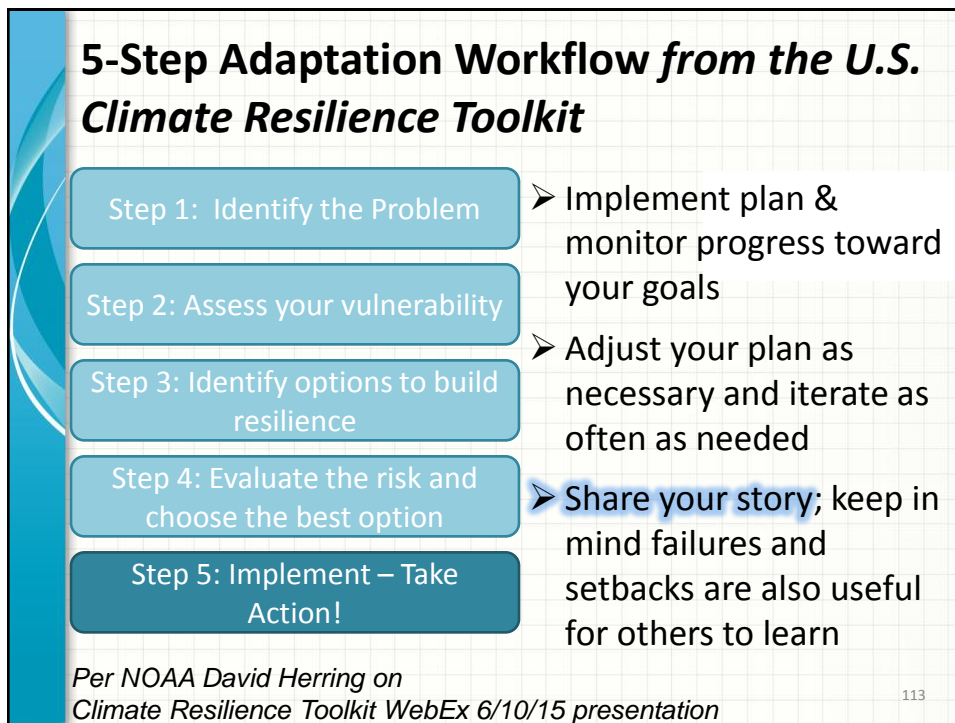
55





- ## Tribal Nations Tools
- [Guidelines for Considering Traditional Knowledges](#)
  - [NWF Climate Smart Conservation](#)
  - [NAU ITEP Adaptation Planning Toolkit](#)
  - [ANTHC Local Environmental Observers Network](#)
  - [\(Swinomish\) Indigenous Health Indicators](#)
  - [ANTHC 7 Generations Community Env. Planning](#)
  - [GWOW Guiding for Tomorrow Sci & TK Integration](#)
  - [Ocean Acidification Curriculum Collection](#)
  - [EPA Tribal-FERST Environmental Issues Solver](#)
- Other Recommended Tools to Include???**
- 112 Please recommend other tribal tools to assist the nation

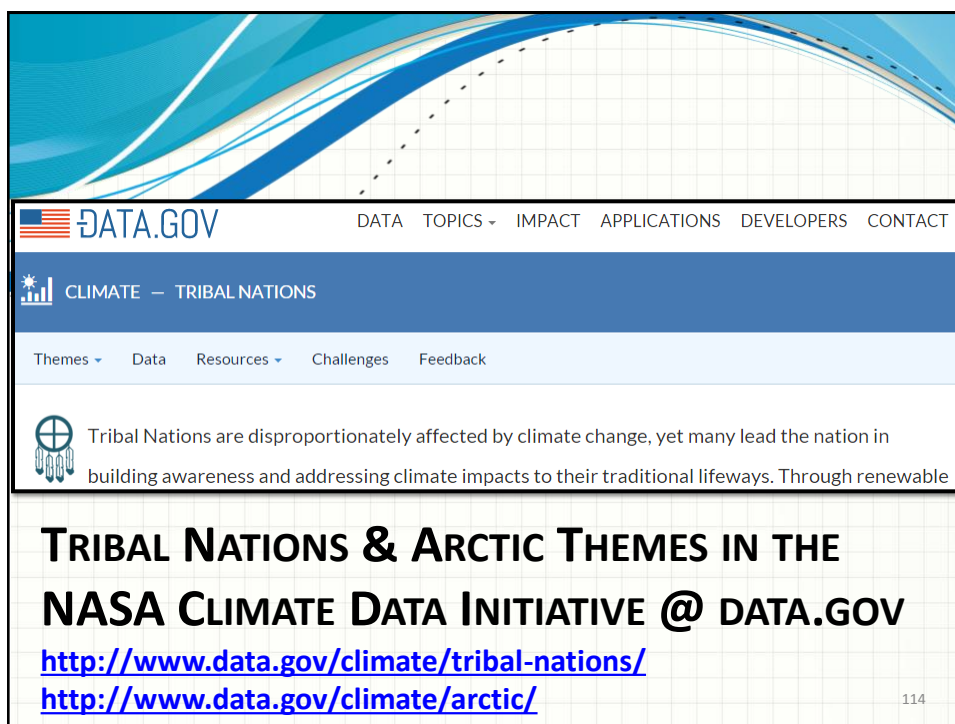
## 5-Step Adaptation Workflow *from the U.S. Climate Resilience Toolkit*



- Step 1: Identify the Problem ➤ Implement plan & monitor progress toward your goals
- Step 2: Assess your vulnerability ➤ Adjust your plan as necessary and iterate as often as needed
- Step 3: Identify options to build resilience
- Step 4: Evaluate the risk and choose the best option ➤ **Share your story**; keep in mind failures and setbacks are also useful for others to learn
- Step 5: Implement – Take Action!

*Per NOAA David Herring on Climate Resilience Toolkit WebEx 6/10/15 presentation*


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DATA GOV DATA TOPICS ▾ IMPACT APPLICATIONS DEVELOPERS CONTACT

CLIMATE — TRIBAL NATIONS

Themes ▾ Data Resources ▾ Challenges Feedback

 Tribal Nations are disproportionately affected by climate change, yet many lead the nation in building awareness and addressing climate impacts to their traditional lifeways. Through renewable

## TRIBAL NATIONS & ARCTIC THEMES IN THE NASA CLIMATE DATA INITIATIVE @ DATA.GOV

<http://www.data.gov/climate/tribal-nations/>  
<http://www.data.gov/climate/arctic/>

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Tribal Nations Theme Components

Overview / Framing Questions

GIS Datasets for Indian Lands, Ceded Lands

Resources > Maps (interactive and printable)

Resources > Tools (by subtopic)

Resources > Featured Content

Mapping Challenges

Organizes [Tools](#) and [Taking Action Stories of Resilience](#)

Arctic & Tribal Nations Theme: Data

Tribal Nations Data

Indian Lands datasets are difficult to understand. Other data sharing questions.

Tribal Nations Data

[BIA Indian Lands Dataset \(Ind\)](#)

[Indian Land Areas Judicially Es](#)

Generally, climate data by themes States, except for differences in data resources:

Arctic Theme – Related data, t

567 federally recognized tribe

Coastal Flooding Theme – Rel

and other communities living a

associated with growing storm

Ecosystem Vulnerability – Rel

integrity and stability of ecosy

which Tribal Nations tradition

CLIMATE – ARCTIC

Themes

Data

Resources

Arctic Data

The U.S. government and its partners hav organized around seven different topic ar

All Arctic data

Arctic Ocean, Sea Ice, and Coasts

Melting Glaciers, Snow, and Ice

Arctic Weather and Extreme Events

Permafrost and Arctic Landscapes

Arctic Development and Transport

Arctic Peoples and Ecosystems

Arctic-Global Teleconnections

Topic Categories:

Arctic Arctic Ocean, Sea Ice and Coasts

Topics:

Climate

Filter by location

Enter location...

118 datasets found

NOAA Climate Data Record (CDR) of Sea S

of 57 recent views

National Oceanic and Atmospheric Administrat

Surface Bundle (OSB) Climate Data Record (CDR

surface atmospheric properties, and heat fluxes...

Maritime Limits and Boundaries of United S

National Oceanic and Atmospheric Administrat

for depicting on its nautical charts the limits of the

Contiguous Zone, and 200 nautical mile...

NOAA Optimum Interpolation 1/4 Degree

Analysis, Version 2 of 25 recent views

National Oceanic and Atmospheric Administrat

sea surface temperature (SST) analysis product w

technique. The SST analysis has a spatial grid...

National Solar Radiation Data Base

Organizes climate data by theme for easy access







Tribal Nations Theme: Map Gallery

Tribal Nations Maps

The Tribal Nations Map Gallery includes printable PDF wall-map versions (24×36) of the Indian and Ceded Lands Web Services found in the data tab.

The Map Gallery also includes interactive maps from federal partners, intertribal groups, and a tribal climate map showcase of example work products to inform climate resilience efforts of tribes, Alaska Natives, and other diverse communities nationwide.







Indian Lands in the United States

Indian Land Areas Judicially Established 1978 and American Indian Reservations

DOE Tribal Energy Programs

Great Lakes Indian Fish and Wildlife Commission Maps



DOI Climate Science Centers

DOI Landscape Cooperatives

USDA Climate Hubs

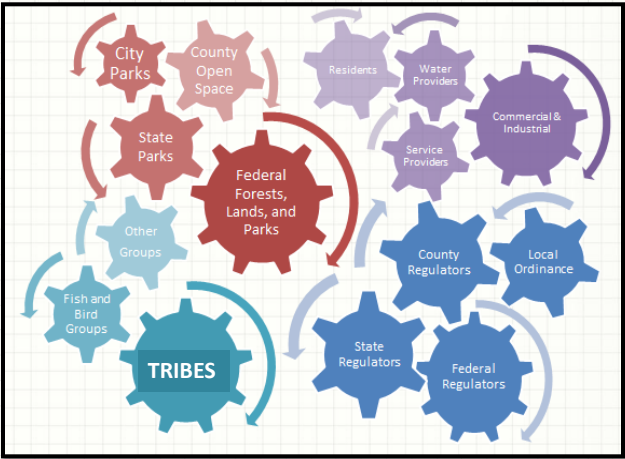
USFS Tribal Connections - US Forest Service Indian Lands Map Viewer

Interactive data access and printable maps

Can add region-specific climate maps here or keep private!

Capacity Building. Leveraging Networks and Partnerships to Build Tribal Resilience

Planning and Implementation Support Networks



Work to build your connections into a machine that leverages every resource!

Questions? Contact Margaret T. Herzog, PE, PMP, PhD

BIA Climate Program, IT / GIS Systems & Services

Margaret.Herzog@bia.gov, (720) 484-3353

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# Resilience

## 1. Specified Resilience

Threshold on underlying controlling variable  
Changes slowly relative to variable of concern

## 2. General Resilience

Ability to absorb unexpected shocks  
Community's ability to *pitch in* as needed

Walker, B.H., and D. Salt. 2012. Resilience Practice: Building capacity to absorb disturbance and maintain function. Island Press, Washington, D.C.

**Systematic, conscious network weaving may help improve general resilience faster!**

# SNA Network Maturity Model: Becoming a *Network Weaver*

The diagram illustrates the SNA Network Maturity Model through four stages, each represented by a network graph and a corresponding chevron arrow pointing right:

- 1. Disconnected Clusters**: A network graph showing several small, isolated clusters of nodes.
- 2. Hub / Spoke**: A network graph showing a central node connected to several peripheral nodes.
- 3. Multi-Hub**: A network graph showing multiple central nodes connected to each other and to peripheral nodes.
- 4. Core-Periphery**: A network graph showing a dense, interconnected core of nodes with many peripheral nodes connected to the core.

Adapted from [Krebs 2006](#), [Zolli & Healy 2012](#)

*Systematically evaluate gaps and hubs and then seek to improve overall structure*

## Seven Generation Philosophy

*Building Resilience for Future Generations*

### Onondaga Nation, Chief Oren Lyons

*When you sit and you council for the welfare of the people, think not of yourself nor of your family nor even your generation. Make your decisions on behalf of the seventh generation coming. Those faces looking up from the earth, layer upon layer, waiting their time.*



#### ***The Future is Looking to Us***

Photo and Caption by Art Ivanhoff  
Bering Sea Alliance, LLC  
<http://www.beringseaalliance.com>

Quote from Lyons, O. April 2008. Oren Lyons: Looking Toward the Seventh Generation. Presentation, American Indian Studies Program, University of Arizona, Tucson, Arizona  
<https://nnidatabase.org/db/video/oren-lyons-looking-toward-seventh-generation>

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# Thank you, make sure to contact me with questions and ideas....

**Margaret T. Herzog**

**PE, PMP, PhD** (< Link to dissertation)

**[Margaret.Herzog@bia.gov](mailto:Margaret.Herzog@bia.gov)**

**(720) 484-3353**

U.S. Department of the Interior, [Bureau of Indian Affairs](#) (Contractor)  
[Tribal Climate Resilience Program](#) **IT / GIS Systems & Services**  
[Sealaska](#) - *Values in Action* (representing the Tlingit, Haida and Tsimshian of SE AK)  
[MBS](#) - *Sealaska Diversity IT Solutions*  
13922 Denver West Parkway, Bldg 54, Suite 300  
Lakewood, Colorado 80401